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NAVAL PRIZE ESSAY.

Subject:

"CONSIDERING THE CHANGES MADE IN NAVAL CONSTRUCTION DURING THE PAST TWENTY YEARS, AND IN VIEW OF THE EXPERIENCE GAINED DURING THE CHINO-JAPANESE AND SPANISH-AMERICAN WARS, WHAT ARE THE BEST TYPES OF WAR-VESSELS FOR THE BRITISH NAVY, INCLUDING ARMOUR, ARMAMENT, AND GENERAL EQUIPMENT FOR SHIPS OF ALL TYPES?"

By Major C. FIELD, R.M.L.I.

"*Fortitudine Vincit.*"

RATHER more than twenty years ago an almost similar subject was set for the Royal United Service Institution Prize Essay,[1] but what a different aspect must the task have presented to the competitors! Then our Navy, or rather the ships of which it was composed, was in what may be almost termed a period of transition, and the greatest uncertainty and divergence of opinion were rife among those who asked themselves the question, "What are the best types of war-vessels for the British Navy," or, for the matter of that, for any Navy?

This was more especially true as regards the question as affecting "battle-ships," as we should now say, or as it was then presented to the competitors, "Vessels for combined action." "Ironclads" was the term at that time more generally in use, and of these we then had a somewhat varied collection. So we have now, it may be said, and with even more variety in their types, as, in addition to most of those we had then, we have all the newer designs that have since been evolved as the science of naval construction has progressed.

Still, at the present day, we have pretty well agreed upon a type that seems to be regarded as a more or less fixed one, although in each batch

[1] Naval Prize Essay, 1876:—"On the Best Types of War-Vessels for the British Navy. Firstly, for combined action; secondly, for single cruisers of great speed; thirdly, for coast defence.

of new ships there are, of course, minor changes, occasioned by the search after improvement. It need hardly be said that the "Royal Sovereign," "Majestic," "Canopus," and "Formidable" classes are referred to, together with the "Renown," and the smaller editions, "Centurion" and "Barfleur." All the others are practically relegated to the second rank, and it is most unlikely that anything which much resembles any one of them will again be built, unless, perhaps, at some future period, an improved copy of the "Nile" or "Trafalgar."

But when in 1876 the question of the most effective type of battle-ship had to be considered, designs as various as the "Hercules," "Devastation," "Audacious," and "Monarch" were all in our first line, and all had their partisans, while some critics—among them the writer of the essay that was adjudged the prize—included in this category the "Nelson" and "Northampton," with their almost totally undefended batteries. The essayist himself went even further, and proposed a class of vessels which were intended to take their place in the line of battle whose guns' crews were to be entirely without armour protection.

It may be noticed, by the way, that amongst other classes of ships set down for discussion were "Coast-defence ships," those craft whose very mention is now so strictly tabooed in connection with the British Navy.

The study of naval history has brought home to us the entire wisdom and truth of the axiom long ago laid down by Lord Bacon:—"He who has command of the sea is at great liberty," wrote that marvellous student of men and politics, "and can take as much or little of the war as he pleases."[1]

But even in 1876 the inclusion of "coast defenders" among the sub-heads of the essay raised a protest from some of the members of the Institution who were present at the discussion which followed its reading. But the very variety of types then contending for recognition as the most suitable for the line of battle, rendered the task of the essayist perhaps easier than it is to-day. He could make his choice and support it with the best arguments and illustrations he could bring forward. Now at a time when, to quote an eminent naval authority,[2] "We have in vessels like the 'Royal Sovereign' and 'Majestic' both the turret-ship and the broadside ironclad combined, and have put in them the best features of both classes," it seems almost as if we had, comparatively speaking, approached finality. Not only do we continue to build battle-ships so much alike, that a squadron of them presents the same uniform appearance that the fleets of Nelson with their long lines of chequer-sided three-deckers do in the pictures with which we are so familiar, but foreign nations are copying the type more or less closely in their newest naval creations. The Russians, the Germans, the Italians, and our cousins across the Atlantic all now build their battle-ships with their principal armament of four heavy guns disposed in pairs in turrets or barbettes, fore and aft on the central line of the ship, with a central battery of heavy Q.F. guns

[1] Bacon's Essays, "On the true Greatness of Kingdoms and Estates."

[2] Captain S. Eardley-Wilmot, R.N., in the discussion on the late Vice-Admiral P. H. Colomb's lecture on "The Future of the Torpedo." JOURNAL, December, 1897.

between them. Even the French, with their great ship-building prestige, the inheritance of centuries, seem now inclined to abandon their favourite types to approach more nearly to our own.

This remarkable consensus of opinion as to the best type of battle-ship renders it very difficult for any writer to hope to suggest any very different type as the "best suited for our needs," and the same, in a somewhat minor degree, applies to the question as affecting cruisers and torpedo craft. One or two additional classes of war-vessels might, perhaps, seem worthy of consideration, but, on the other hand, it cannot be denied that multiplication of types is far from desirable.

One great advantage, however, is presented to competitors in the present Prize Essay which was denied to those who competed in 1876, and this is, the opportunity of studying the object-lessons afforded by the recent naval campaigns in Chinese and American waters.

Though neither in the Chino-Japanese War, nor in the Spanish-American War, were the combatants at all evenly matched as regards *personnel*, yet one and all made an extensive use of modern ships, guns, and appliances. In 1876 there had been no naval engagement worthy of the name for a decade. The Franco-German War was altogether a military campaign, so that the only sea fight between ironclads that could be studied was the battle of Lissa that had taken place ten years previously.

Before, then, we go on to consider "What are the best types of war-vessels for our Navy, having in view the experiences of the two latest naval campaigns," it will be as well, in the first place, to briefly summarise the most salient lessons that we have to learn from them, after which it may be worth while to discuss the question of how far our present men-of-war seem likely to meet our requirements when considered in the light of these experiences. Finally, the types of fighting craft of all classes that are submitted for consideration as being, in the opinion of the writer, the most adapted to our needs, will be suggested in their proper order.

The Lessons of the Chino-Japanese and American Wars.

Leaving aside strategical considerations, which, except indirectly in the matters of speed and coal endurance, do not come within the scope of the present paper, the following are suggested as the most important lessons affecting the construction of fighting craft, which we have to learn from the war between China and Japan in 1894 and from the more recent hostilities between Spain and the United States of America.

1. The urgent necessity for the removal of every possible portion of woodwork which now enters into the interior construction of a man-of-war, on account of the absolute certainty of its giving rise to a conflagration if exposed to an effective shell-fire. As a corollary to this may be considered the advisability of improving the protection of the fire-mains.

2. The necessity of providing thorough protection for the guns' crews.
3. The fact that armour-plating has shown itself more effective than had generally been supposed.
4. The uselessness, not to say danger, of lightly armoured gun shields.
5. The suicidal nature of the custom of mounting torpedo-tubes above water.
6. The comparatively slight effect of the heaviest guns, when their cost, weight, and slowness of fire are considered.
7. The very great value and efficiency of Q.F. cannon, especially the heavier classes of weapon.
8. The importance of homogeneity in a fleet or squadron.

In addition to the above, there are one or two what may perhaps be termed "negative inferences" to be drawn from the events of the Chino-Japanese and Spanish-American wars. Of these the following are noteworthy :—

1. The absence of any deliberate attempt to make use of the ram, which would seem to indicate that there was a consensus of opinion among the commanders of the ships engaged in the different actions that "the game was not worth the candle."
2. Comparatively little effort (except on the part of the Japanese at Wei-hai-Wei) to utilise the Whitehead automobile torpedo as a weapon of offence. The inference that may be drawn from this is that when the danger attending its use was taken into consideration the belligerents decided that the gun was by far the more generally effective and practical weapon. There is another reason for its non-use by the Japanese and the Americans, which will be adverted to later.

We have to see how these lessons were demonstrated by the events of the two wars to which reference has been made, and we will consider each in its proper order as arranged above.

I.—The Necessity of Better Precautions against Fire in Action.

The first lesson on our list was deeply impressed on the naval world as soon as ever the Chinese and Japanese fleets had come in contact off the mouth of the River Yalu. Although many conditions operated against the Chinese, fire in the end proved their most dangerous adversary. That this was occasioned by the superior accuracy and rapidity of the Japanese cannonade is of course obvious, but does not discount the lesson that is taught of the acute peril that attends the use of wood in the construction and fitting of war-vessels. Under the hail of shell from the Japanese quick-firers, decks, bulkheadings, and doors were set on fire, and even

hammocks and boats burst into flames from the blaze of the exploding projectiles, whilst most of the Chinese hoses were cut through and burnt early in the action. The cruiser "Lai Yuen" was burnt out almost to a shell, so that it was with difficulty that she regained port; the "Tchao Yong" and "Yang Wei" suffered as badly, the "King Yuen" caught fire and eventually sank. The armour-clad "Ting Yuen" had at one time a fierce conflagration raging near her sick bay, while her sister ship the "Chen Yuen" was also set on fire more than once, although it is stated that her decks were flooded with half-an-inch of water before going into action, as a special measure of precaution against the devouring element. Nor did the Japanese altogether escape, for their flag-ship, the "Matsushima," was set on fire by a heavy shell from the "Chen Yuen," which ignited a pile of ammunition which had been collected for the quicker supply of the guns. The "Hei-Yei" was also ablaze at one time. There is one point to be noted in this action which contrasts rather strongly with the story of the engagements off Manila and Santiago, and this is, that both the Japanese and, in some cases, even the Chinese, with their defective discipline and morale, contrived to get the fires under, while in the latter battles the Spaniards, with presumably better training and (at Santiago) later appliances, signally failed to do this, but gave up the fight and ran their ships ashore. But, at Manilla, the Spanish ships were hopelessly feeble and out of date, only two of them having even an armoured deck, so that their destruction was inevitable. Only half of them, moreover, had steam up when attacked by the immensely superior squadron under Admiral Dewey. No comparison whatever is possible. The Spaniards were foredoomed to destruction, and nothing their crews could have done would have saved them.

But at Santiago the Spanish ships, although in inferior force, were modern and effective vessels. Still in this action the conflagrations that broke out on board the "Infanta Maria Teresa," the "Vizcaya," and the "Oquendo," would seem to have almost at once reached appalling dimensions. According to the American official report, the first and last named were set on fire during the first quarter of an hour's fighting, while the "Vizcaya" very soon was also in flames. When the wrecks came to be examined by the Board of American officers appointed for the purpose it was reported that, "the woodwork having been all burned away, it is possible that the evidences of some hits have been obliterated."[1] The heat was such as to blister off the outer coat of black paint on these ships down to the water-line. The "Infanta Maria Teresa" was the first ship to come under the fire of the Americans as she quitted the shelter of the harbour of Santiago, and the first shot which struck her is said to have "destroyed the fire mains, making it impossible to extinguish the flames in the after part of the ship that were started by the explosion of a second shell in the Admiral's cabin."[1] The "Oquendo" was set on fire by a shell which exploded the torpedoes in the after torpedo compartment.

The terrible destruction and demoralisation caused by these fires led the Americans to at once set about profiting by the object-lesson presented

[1] *Scientific American*, 30th July, 1898.

to them, and the removal of all woodwork on the "Chicago" and "Newark" which were just being re-constructed was immediately ordered. The Germans, on their part, had not waited for Santiago before they took this matter seriously in hand. The Yalu fight was enough for them, and as soon as the facts of that engagement became known Herr Dietrich, Constructor-in-Chief of the Imperial Navy, decided that in his new ships wood should only be used in the most sparing manner. He claims, by the way, that not only are they thereby rendered less inflammable, but that a considerable amount of weight is saved, which may be utilised for additional armour and armament.

II.—The Necessity of Providing Thorough Protection for the Guns' Crews.

The general idea that a ship will be put out of action by damage to her water-line rather than by injury to her upper works and by casualties among her crew seems to have been very usually accepted for some time, although now and again writers and speakers on naval matters have expressed a contrary opinion. But if we study the list of casualties among the ships of the four belligerents in the wars now under consideration, we shall see that if we are to be guided by the lessons of these campaigns, it is at least as necessary to consider the protection of the crew and the above-water portions of a ship of war as to provide a practically unsinkable gun platform. In the first encounter in the Chino-Japanese War the "Tsi-Yuen" was obliged to discontinue the fight with a superior force of Japanese ships, not because there was any chance of her sinking, but because of the injuries inflicted on her battery and crew by their fire. At the Yalu fight the "Matsushima," the Japanese flag-ship, was put out of action by above-water injuries. Fire, and the wrecking of superstructures and batteries by the torrent of Japanese projectiles, accounted for all the casualties among the Chinese ships with the single exception of the "Chih Yuen," which on attempting to ram the "Yoshino" is said to have been sunk by the penetration of her water-line. Even in this case there is, it is said, a possibility that she was destroyed by the explosion of a torpedo which had been allowed to remain in her tubes. The "King Yuen," too, eventually sank, but before that she was on fire and apparently not under control, so that she was *hors de combat* before she sank, and there is too a possibility that she may have done so by the opening of the sea-cocks to flood her magazine. Even at Manilla, where the superannuated Spanish vessels were, with two exceptions, entirely unprovided with any water-line protection whatsoever, there is no record of a ship having been sunk outright by the overwhelming American cannonade. Although the "Reina Cristina," Montojo's flag-ship, was struck some seventy times in the first three quarters of an hour of the fight, she was not sunk but set on fire. Those Spanish ships which were not burnt were run ashore or scuttled by their crews. Theoretically they should most of them have been sunk by gun fire in twenty minutes or so, if we consider the fine armament and generally good shooting of the Americans and their own offenceless and defenceless condition.

At the battle of Santiago the "Infanta Maria Teresa," the "Vizcaya" and the "Oquendo" were all put out of action by the effect of the American fire on their hulls above the water-line, which wrecked everything, made a shambles of their batteries, and set their decks and woodwork ablaze, while the "Colon" was run ashore by her commander when escape was impossible. In no case was there any damage at the water-line sufficient to imperil the flotation of the ship.

If we in the future construction of our war-ships are careful to follow the lessons inculcated by the above experiences of actual warfare, we can hardly help giving the greatest consideration to the provision of an extensive armour surface for the protection of the batteries and more important portion of the hull above water. It may be, perhaps, contended that if we make our ships more uninflammable we can afford to leave a large part of them open to the free passage of explosive projectiles. But the great penetration of the fragments of shell having high-explosive bursters would, even in that case, expose us, when opposed to an enemy who can make good use of his guns, to great loss of men and to the destruction of the whole interior fittings of our ships above the armoured deck.

If we add to this the chances of asphyxiation by the fumes of some of the newer classes of high explosives, we must, without fail, come to the conclusion that at whatever cost in the reduction of armament or of coal, a considerable portion of our war-vessels amidships must be rendered impervious to anything but comparatively heavy projectiles, except under circumstances exceptionally favourable to the gun. With the improved toughness of modern armour and the proofs which the two last naval wars have given of the excellent defensive qualities of armour in general, this should surely not be beyond the power of our designers.

III.—The Fact that Armour-Plating has shown itself More Effective than had generally been supposed.

Once iron-plating was introduced as a means of protection for men-of-war, the battle between guns and armour commenced. As the guns grew heavier and more powerful, the armour grew thicker, for it is only in the later history of the contest that the manufacturers of protective plating have made such gigantic strides in the quality of their armour that for the present it seems to have beaten the gun. Possibly this may be disputed, but although the penetrative powers of modern cannon have increased in quite a remarkable ratio, it cannot be denied that armour has improved in its qualities of resistance even more wonderfully. But at first it grew thicker and heavier, as we have said, so that the area protected had to be more and more reduced on account of the immense weight of the cuirass. The converse of this was, of course, that the unprotected area increased, and this occasioned the advent of the medium sized gun for its attack. Hence the secondary batteries now carried by men-of-war, originally breech-loading guns, but now in every modern ship Q.F. ordnance. This, again, produced shields and thin armour for their

protection from lighter pieces and machine guns, and this protection has now reached a considerable thickness in the more modern ships, so that the evolution of armour and armament seems to be proceeding in a series of circles. Up to the Chino-Japanese War experiment was the only basis the builders of guns and armour had to go upon. But the experiences of the Yalu fight and the battle of Santiago, though they cannot be regarded as altogether conclusive, would seem to go far to show that whatever the theoretical and experimental penetration, it is likely to be even less under service conditions than had heretofore been expected, even by those who recognised that peace-time trials were generally rather in favour of the gun. To quote Captain Mahan, the well-known American naval critic and historian, in reference to the battle of the Yalu[1]: "The result shews, as most of us would have foreseen, had we stopped to think, that armour is actually a far better protection than is indicated by the trials of the testing ground, where, for purposes of extreme proof, all the off-chances are given to the gun. On the trial ground the victory of the gun has, with occasional fluctuations of opinion, been generally taken as proved; in the Yalu fight the armour came out ahead when it was struck."

The particular armour in question was that of the two Chinese battle-ships "Ting Yuen" and "Chen Yuen," and consisted of a belt, citadel, and barbettes of 12- and 14-inch compound armour. According to Captain P. McGiffen, who practically commanded the latter in the engagement, her armour was struck "by dozens of A.P. projectiles from the enemy's 13-inch Canet guns," but not a single shot penetrated more than 4 inches."[2]

The Japanese guns referred to, long Canet 32-centimetre (12·6-inch) weapons, were carried by the "Matsushima,"[3] "Ikitsushima," and "Hashidate,"[3] and are described by Captain Orde Brown, R.A., in "Brassey's Annual" for 1895, as "the most formidable guns afloat" as regards penetration, being capable (theoretically) of sending their projectiles through 38·3 inches of iron.

But, though this would seem incontestably to prove that armour was at least twice as impenetrable in practice as had been calculated, it is to be feared that Captain P. McGiffen's narrative in this and other points is more dramatic than exact. The Japanese only possessed three or four of these guns, and one of these on board the "Matsushima" was put out of action by a heavy Chinese projectile. Add to this that they are exceptionally slow-working guns, even for their size, can hardly have fired more than one round in five minutes, in all probability, and were

[1] Captain Mahan, United States Navy, "Lessons of the Yalu Fight."—*Harper's Magazine*, August, 1895.

[2] "The Battle of the Yalu."—*Harper's Magazine*, August, 1895.

[3] Captain McGiffen, in the account already quoted, and the writer of the article on "Ordnance" in "Brassey's Annual," 1895 (p. 319), say that the "Ikitsushima" also had one of these guns. But in the latter work she is not shown as having it on the list of ships engaged on p. 103, nor in the general list of Japanese ships, p. 254. Nor does it appear in the Austrian Marine Almanac for 1895.

firing at a long range at a comparatively small target, and the "dozens of hits" seem doubtful. Turning to other accounts of the fight, "One gun is said to have fired three times, sending its shell well home once. Another did better, a third was put *hors de combat* by a Chinese shell."[1]

However this may have been, it seems pretty certain that the armour of the two Chinese ironclads was not pierced, and the assertion that it was struck by some of the heavier natures of projectiles has not been contradicted. But a more recent and a more valuable lesson is afforded by the Spanish cruiser "Colon" at the battle of Santiago. This vessel had her whole water-line and battery protected by an extensive cuirass of 6-inch Harveyized armour. She came out third from the harbour when Cervera's squadron made their dash for liberty, and so one would at first be inclined to think would have come in for a worse hammering than the leading ships, as the Americans would be quite ready to receive her. But whether she contrived to keep them between herself and the enemy, or whether the American gunners were so interested in watching the effect of their fire on the two ships which preceded her, it seems that she was hit by far fewer projectiles than were her consorts. The official examination made after the battle reports that she was struck eight times. Two of these hits were on the armour, a 6-pounder shell which penetrated two inches, and a 5-inch A.P. projectile, which, striking at an angle of 45°, failed to penetrate, but rebounded. The latter is capable, theoretically, of piercing 12 or 13 inches of iron. But as the "Colon," when examined, was lying on her starboard side with little more than half her length above water, it is probable that she was struck a good many more times than this.

One point in connection with her extensive armour protection is noteworthy, and this is, that it would seem to have given greater confidence, and hence accuracy, to her gunners. She was the only Spanish ship that hit the "Brooklyn" with anything heavier than a 6-pounder. The other hits on the American were made by 6-inch and 4·7-inch weapons, calibres that were carried by the "Colon" alone. This more effective practice may not only have been due to increased confidence, but also from immunity from the fires that broke out on board her consorts and drove their men from their guns.

IV.—The Danger of Thin Gun Shields.

The improvements in rifle calibre and heavier types of machine guns rendered it necessary to provide some sort of protection from their fire for the crews of guns mounted on the upper decks and in open barbettes. Hence the introduction of shields of various form and thickness which could be moved round with the gun. This, of course, limited the weight possible to be carried, and thus the thickness of steel employed for this purpose except in the case of heavy barbette guns traversed by machinery, but even with them, for a considerable time, a comparatively light shield

[1] "Brassey Annual," 1895, p. 321.

was considered to meet all requirements. And so it would have done, had not the heavier Nordenfeldt and the Hotchkiss machine gun, or revolver cannon, been superseded by the 3-, 6-, and 12-pounder quick-firers, and had not the system of quick-firing been extended to guns of from 4 to 8 inches calibre. The light revolving shields now became not only inefficient for the purpose for which they were designed, but proved an absolute source of danger to the very men they were intended to protect. Projectiles, which in their absence would have passed harmlessly over the heads of the guns' crews, were exploded by them with the greatest possible effect. They became perfect shell-traps. The Chinese had early experience of this in the late war with Japan, in the engagement between the "Tsi-Yuen" and the Japanese cruisers "Yoshino," "Naniwa," and "Akitsusu," which took place on 25th July, before the actual declaration of war.

The "Tsi-Yuen's" guns were protected by light closed-in shields of turret form, and one at least was instrumental in bursting a Japanese shell with disastrous effect. Another was pierced, but owing to some defect in the projectile, it failed to explode, passed through the armoured deck, and out at the ship's side. In consequence of this, the Chinese removed a number of their gun-shields, including those which covered the barbettes in the battle-ships "Chen Yuen" and "Ting Yuen," and, according to Commander McGiffen, with the best results. The Japanese did not follow their example, but, as they probably knew that the Chinese had but a very limited number of Q.F. cannon and reckoned also on the inefficiency of their gunners, they perhaps considered that it was not worth their while to do so. At the battle of the Yalu their views received confirmation, for the gunnery of the Chinese was but poor as compared with their own, not so much perhaps from badness of aim as from poor supplies of cannon and suitable projectiles.

Turning to the last naval campaign, a good example of the danger of thin gun-shields is afforded by the Spanish cruiser "Oquendo," which in the Santiago fight was struck by an 8-inch shell on the hood of the foremost 11-inch gun. The shield was about 2 inches in thickness, and the projectile passed through it and burst, killing everyone in the barbette and disabling the gun. On board the "Infanta Maria Teresa," "on the same occasion, another 8-inch shell struck the shield of the second 5½-inch gun, passed through it, ranging aft, and exploded. The effect of the explosion upon everything about the decks in that vicinity must have been terrific."[1] These examples are surely enough to prove that shields, unless at least 4 or 5 inches thick, are more harmful than useful. Must we then leave our gunners in many cases exposed to the rifle-calibre machine-gun fire of their enemies? That might spell disaster. There seems nothing for it but to face the extra expense and the difficulty attending the substitution of regular armoured protection for every gun in the secondary batteries of a man-of-war, and if this can be further extended to some of the lighter nature of guns so much the better.

[1] American Official Report.

V.—The Peril Attending the Use of Above-water Torpedo-tubes.

The automobile torpedo, though now a much more formidable and accurate weapon than it was when first introduced, has not, so far at least, revolutionised naval warfare in the way that was expected by some enthusiasts. Whether from its failure hitherto to do anything very remarkable, or because "familiarity breeds contempt," as says the old proverb, or else because the improvements in anti-torpedo-boat artillery have created a feeling of comparative security, it does not seem to be so much dreaded as was formerly the case. Nevertheless, its formidable nature cannot be denied, and, leaving torpedo-boats and destroyers out of the question, there are few men-of-war that are not provided with means for its discharge.

Till a comparatively recent date, torpedo impulse tubes were almost invariably placed above the water-line, and most frequently without any armour protection. The danger of this practice has been constantly pointed out from the time that small rapid-firing guns became an item in the equipment of a fighting-vessel, but it was reserved for the late Spanish-American War[1] to demonstrate how true were the critics' predictions. In the battle which terminated in the destruction of Admiral Cervera's squadron, the "Oquendo" is supposed to have had a torpedo exploded by a 5- or 6-inch shell with disastrous effect; two 12-inch projectiles, which burst in the after torpedo-room of the "Infanta Maria Teresa," are thought to have caused the explosion of others, while there was after the fight a gaping hole in the starboard bow of the "Vizcaya," which was also put down to a similar cause.

Although there is no record of this class of mishap (except possibly in the case of the "Chih Yuen" already referred to) in the Chino-Japanese War of 1894, yet it would seem that both combatants fully recognised the possibility—nay, the probability of being "hoist with their own petards"—as it is stated that the Chinese, as soon as the Yalu fight began, or rather was about to begin, incontinently discharged all the torpedoes they had in their tubes in order to get them out of harm's way, while the Japanese on their part made no attempt to use weapons so hazardous to handle under shell-fire. Our own naval constructors and designers were among the first to successfully introduce the under-water torpedo-tube, and it is probable that except in very small craft the days of the above-water tube are numbered.

VI.—Slight Comparative Effect of the Heaviest Natures of Guns.

At one period, that of very thick armour plating, the monster gun was considered, *par excellence*, the premier naval weapon, practically the only one—witness the armament of the "Devastation" class, the 80-ton guns

[1] The "Chih Yuen" at the Yalu may have had a torpedo exploded in its tube. (See page 848).

of the "Inflexible" and the 100-tonners of the Italian battle-ships "Duilio" and "Dandolo." Big guns, though of less weight than the above, still form what is called the "primary armament" of all battle-ships; but the wonderful rapidity of fire possessed by even the heavier natures of modern Q.F. ordnance has proved such a close rival in destructiveness that they cannot be regarded with quite the same veneration as before. Nor have the experiences of the Chino-Japanese and Spanish-American Wars tended to increase our estimate of the superlative efficiency of the heaviest guns now carried afloat. At the battle of the Yalu, as has been already pointed out under the head of "The Effectiveness of Armour Protection"[1] the three or four big 12·6-inch Canet guns used by the Japanese certainly did not pierce the 12-year-old armour of the two Chinese battle-ships, even if they succeeded in hitting it. A shell from one of the "Chen Yuen's" 12-inch Krupps, it is true, created wide-spread destruction on board the "Matsushima" putting her heavy after gun out of action, hurling a smaller one overboard and setting the ship on fire. But as it appears that it did this by striking and exploding a considerable accumulation of heavy gun ammunition in an unarmoured position, which a very much smaller shell might have done equally well, the damage cannot be scored to the size of the projectile, nor do the reports on the battle of Santiago incline their readers to form a very high opinion of the general service effectiveness of the "big gun." The American ships which were engaged carried between them eight 13-inch and six 12-inch guns all under thick armour so that their gunners should have been able to direct their fire with the utmost coolness and precision, especially when the wild and feeble return fire of their opponents is taken into consideration.

But what was their record? When the wrecked Spanish cruisers were afterwards examined by a board of experts no hit by any 13-inch projectile could be discovered, and only two made by 12-inch shell. These were on the port quarter of the "Infanta Maria Teresa" and close together. In all probability they arrived simultaneously from the same turret. They are thought to have exploded one or more torpedoes in the after torpedo-room and made a large hole in the starboard side of the ship. Yet the 11-inch gun in its barbette, which was situated almost immediately above their point of impact, is reported to have been found in excellent condition. Many of the shell from the 8-inch guns carried by the American ships would seem to have done almost as much damage, and as the eighteen of them which were in action made between them a dozen hits there is no doubt that they proved much more formidable to the enemy than did the fourteen very heavy guns with their poor score of two hits.

Still at present the "primary armament" of our own and of foreign battle-ships cannot be altogether dispensed with, as it provides the only means of piercing the heaviest natures of armour. But it may be questioned whether, after the experience of their effect against the unarmoured stern of the "Infanta Maria Teresa," the poor records of their shooting

[1] See page 850.

and the increasing penetration of the newest guns of less calibre, it is worth while to waste their ammunition against anything short of a battle-ship. Would it not be best to reserve it for an occasion, which in warfare might at any time present itself, when its use would be indispensable?

VII.—The Great Value and Efficiency of Q.F. Cannon.

This was amply demonstrated at the battle of the Yalu by the Japanese, who had batteries of 4·7-inch quick-firers in nearly all their ships which were present. The Chinese, on the other hand, are not supposed to have had more than two or three of these guns in their whole squadron, and no quick-firers of higher calibre. They had a considerable number of 3-, 4-, and 6-pounder rapid-firers, but so also had their opponents. But with the two or three Q.F. 4·7 guns that they had and a couple of breech-loaders of the same calibre the Chinese contrived to hit the "Sakio" eleven times. In fact, this scoring compares favourably with the record of the American 4- and 5-inch quick-firers at Santiago. Of the two calibres together they had nine in action, and made between them twenty-seven hits, an average of three a gun. The Chinamen, too, were under a much more severe fire than the Spaniards were able to direct upon the American gunners. But in both battles the greater part of the havoc and destruction, the explosion of torpedoes in their tubes and the setting up of the conflagrations, which played so important a part in the discomfiture of the defeated side, may be safely credited to the quick-firers, whose volume of fire to a great extent made up for any want of accuracy that there may have been. Their closest rival without doubt has been the 8-inch slow-firing breech-loader which was extensively used by the Americans both at Manilla and at Santiago. This probably was on account of the greater size of its projectiles and of their bursting charges, combined with a fair rapidity of fire. It may be observed that the 6-inch Q.F. with its 100-lb. shell, which occupies such an important position in our own naval armament, was not employed in either of the battles which we have been engaged in considering, the 4-inch, 4·7-inch, and 5-inch guns being not nearly such powerful weapons. Still, when we look at the record of the American 8-inch breech-loaders and also recognise, as no one can help doing, the necessity of applying the quick-firing system to the greater number of guns we carry in our war-ships, the two considerations taken together would seem to point to the increasing of the offensive power of our future battle-ships by substituting 8-inch quick-firers for some at any rate of the 6-inch weapons now carried. The 8-inch Q.F. cannon is an accomplished fact and is entering into the armament of a good number of foreign war-vessels, and the question arises whether it would not be preferable to increase the effective fire of our ships in this way, rather than smother our ships with lighter pieces as the Russians are doing in some of their latest battle-ships.

There is another lesson in connection with the use of Q.F. ordnance that is brought home to us by the events of the Chino-Japanese and Spanish-American Wars, and this is, the importance of having an ample supply of ammunition for them and a means for its rapid transference

under efficient protection from magazine to gun. At the Yalu, as we have already seen, disaster fell upon the "Matsushima" from the explosion of a pile of cartridges which had been accumulated in an unprotected position in order to keep up the supply for the heavy Q.F. guns which were eating ammunition at a terrible rate. At Manilla, according to one account,[1] after two and a half hours' firing, Admiral Dewey drew his ships out of range, not in order to rest his crews and let them get their dinners, as has generally been reported, but because his ammunition was getting low and he wished to take stock of it and see if he could not devise some other and less expensive expedient for destroying the Spanish ships, which still presented a bold front in spite of their tremendous inferiority in every particular. Accumulation of ammunition should not be required. A ship armed with Q.F. cannon must have a rapid means of supplying them with a constant stream of projectiles from below the water-line, by means of hoists continuously running and actuated by small electric motors or other means if considered preferable. Should there be any cessation of fire at a gun or guns so supplied, the arrangement should be such that the cartridges would descend again in their places on their carriers on an endless chain. The magazine party would only have to see that there were no empty carriers on the ascending part as it passed them.

VIII.—The Importance of Homogeneity.

This lesson has been learnt, or at least, recognised, sometime since by our naval constructors, and we now build our ships in batches of several sister ships at a time, and in later types adhere very closely to a certain general pattern, though, of course, as many improvements as are possible are made, or we should soon lag behind the times. The French, rather late in the day, it is true, are beginning to follow our example in this respect and frankly commend our wisdom in adopting this course, instead of falling into their error of striving after an ideal battle-ship or cruiser before seriously taking in hand a number of reasonably good ones. This policy has provided them with a perfect museum of various types, some doubtless very good ones, but when combined into squadrons and fleets the want of homogeneity has much impaired their collective efficiency. What a very different fight the Chinese might have made off the Yalu River had they had a couple more ironclads like the "Chen Yuen" and "Ting Yuen," in the place of the numerous but heterogeneous collection of cruisers and gun-boats (protected and unprotected) which formed Admiral Ting's line of battle!

Want of homogeneity, too, considerably reduced the effectiveness of the Japanese fleet with which they were engaged. Owing to the presence of a proportion of old and slow war-vessels of various kinds, Admiral Ito had to divide his fleet into two squadrons of very unequal strength and speed, and though he manœuvred with considerable skill to make up

[1] That of Stickney, Admiral Dewey's secretary, quoted by Vice-Admiral Sir N. Bowden-Smith, K.C.B., in the discussion on the late Vice-Admiral Colomb's paper on "Lessons of the Spanish-American War." R.U.S.I. Journal, April, 1899.

for this weak point, yet he was compelled, as soon as the fighting began, to leave his four weakest vessels in the rear, where they got considerably knocked about by the main body of the Chinese before he could extricate them.

The importance of homogeneity was not conspicuously demonstrated by any of the events of the Spanish-American War. The Americans had the whole affair their own way from start to finish, and though their fleets which were engaged in the Manilla and Cuban campaigns were not particularly homogeneous yet they far and away outmatched the Spaniards, as, indeed, they would have done had every ship at their disposal been of different speed, tonnage, armour, and armament.

Turning now to the negative inferences to be drawn from the experiences of the Chino-Japanese and Spanish-American Wars, we find the principal ones in connection with the use of the ram, and, secondly, the automobile torpedo.

I.—The Use of the Ram.

In neither of the two campaigns which are referred to in the subject set for this essay was there any case of a ship being rammed. The captain of the "Chih Yuen," a protected cruiser, made a rush towards the Japanese squadron at the Yalu fight with the intention, as it is supposed, of ramming the first opponent he came across, but his ship was sunk, almost as soon as she started out from the ruck of the Chinese, by a concentrated fire. No other attempt is recorded, and so the only lesson we can learn as to the employment of this weapon is a negative one. It is that, as with the exception quoted, no captain in either campaign tried the ramming powers of his ship, we may perhaps assume that they considered that "the game was not worth the candle," the chances of incapacitating their own vessels being considered too great. At Manilla the Americans certainly would have been foolish to run any risk in that way, being so superior to their enemies with their guns alone.

At Santiago it was their object to compel the Spaniards to surrender without their ships being sunk, and so lost to the victors.

The Spaniards might, perhaps, have employed it as a last resource with some effect.[1] But they were too fully occupied in trying to escape to attempt it. Santiago was not a battle, but a rout.

II.—The Use of the Automobile Torpedo.

Great expectations were at one time formed of the extent to which the automobile Whitehead or Schwartzkopf torpedoes were likely to influence the issue of wars in the immediate future. But whether the prognostications of its advocates and admirers be borne out in a future war or not, there was nothing that happened in the Chino-Japanese or

[1] The "Vizcaya" at Santiago is said to have made an attempt to close on the "Brooklyn," possibly with the view to ramming her, but more probably to use her bow torpedo, which was almost immediately exploded in its tube by the American fire.

American Wars which in any way strengthened their case. Rather the contrary; for we may set against the successes achieved by the Japanese torpedo-boats at Wei-hai-Wei the dread of the torpedoes which they carried in their own tubes which induced the Chinese at Yalu to fire them aimlessly away before going into action, and the disasters which befel some of the Spanish ships at Santiago from the explosion of their own torpedoes by the projectiles of the Americans. The Japanese cruiser "Naniwa" fired a torpedo at the transport "Kowsing," but considered it necessary to supplement it by a concentrated fire from her heavy battery, while against the Chinese ironclads at Yalu, Admiral Ito, so far as it is known, made no use whatever of these weapons, probably for the same reason that induced his opponents to get rid of theirs as soon as a collision was imminent. As for the Japanese torpedo-boat attack at Wei-hai-Wei, in which they succeeded in sinking two Chinese men-of-war, it is questionable whether it should not be rather scored against the use of the torpedo rather than in favour of it. The attacking boats were well equipped, their *personnel* was excellent, and their officers brave, scientific, and daring. The Chinese fleet was more or less crippled, officers and men by no means to be compared in efficiency with their foes, and the anti-torpedo-boat armament of Q.F. guns very feeble when compared with that usually carried. Can it be doubted that had the objective of the Japanese been a French or British fleet, the result would have been in all probability the destruction of the whole of the attacking force without the loss of a ship by the defence?

No lesson or theory can be drawn from the failure of either the Chinese or Spaniards to use their torpedo-boats to attack the blockading squadron off Wei-hai-Wei or Santiago, for initiative was absolutely wanting in the officers of both nations. The only remark that can be made in reference to this is that to make effective use of torpedo-boats a bold and efficient body of officers and men is a *sine quâ non*.

These are most likely to be found in the finest Navies, and not in the second-rate ones. So that though the torpedo is, in some sense, considered to be the weapon of the weak from its cheapness and the hope that by its means and good luck the preponderance of a powerful enemy may be reduced, yet the chances are that the torpedo service of a feeble naval Power will fail in its *personnel*.

The Americans very possibly might have made a successful torpedo attack on Admiral Cervera's squadron as it lay at anchor in the harbour of Santiago; but having the Spanish ships well "bottled up," they might reasonably hope that they might fall into their hands intact, sooner or later. Still, had they made an early and successful attack, the work of the Army would probably have been much shortened and the defence of the city would have most likely collapsed much sooner than it did.

Similarly, although the Japanese might also have reckoned with fair certainty that in a short time they would be able to capture Admiral Ting's fleet in Wei-hai-Wei, yet the inclemency of the weather was such that they were bound to use every effort to shorten the blockade.

This probably was the especial motive of their torpedo-boat attack. The only other incident worthy of note in the torpedo work in the two wars which we are engaged in considering is the hopeless rush of the Spanish destroyers "Pluton" and "Furor" out of Santiago Harbour in broad daylight at the time Admiral Cervera led his fleet out to its destruction.

Had they kept on the off-side of their cruisers it is just possible that they might have got a chance of using their torpedoes with some effect. As it was, they were handled in a way that can only be described as a compound of madness, fatuousness, and ignorance, and, as might have been foreseen, were literally blown out of the water in a very few minutes. To suggest as a lesson that this procedure is inadvisable, would be to insult the intelligence of the officers of any Navy in the world.

What, then, are we to gather generally from the record of the automobile torpedo in the last two naval campaigns? Are we to assume from its comparative failure that it is a much over-rated weapon and that it is not to be feared?

No. This would be going too far. The Chino-Japanese and the Spanish-American Wars were both too one-sided, and especially so in the initiative, which alone can hope to use torpedoes with effect, for us to hastily form such a sweeping conclusion. But, at the same time, it may be suggested, on the one hand, that too much must not be expected of the weapon, even against a comparatively inactive enemy; and, on the other, that with a smart and alert crew and a good complement of Q.F. guns, it may not prove such a formidable menace as has sometimes been apprehended.

Our Own Navy and its Duties.

Having glanced, however cursorily, at the lessons to be gathered from the events of the Chino-Japanese and Spanish-American Wars, it is now necessary to consider what types of vessels these point to as being most suitable to the needs of the British Empire.

These needs are many more than those of any nation under the sun. For on what Navy falls the variety of duties and responsibilities that devolve on our own? In war, first and foremost there are the battle-ships of the enemy to be sought, sunk, and destroyed, or if they seek shelter in the nowadays almost invulnerable recesses of their well-defended naval ports, on the Navy falls the duty of preventing their escape into open waters without being brought to action. Our enormous floating trade, coming and going to and from all the ends of the earth, must, so far as is humanly possible, be protected from the attacks of the roving cruisers of an enemy that are sure of inflicting some loss, owing to the world-wide target presented by our commerce.

Nor is the monetary loss, which must inevitably be the consequence of these attacks on this vulnerable point, the only danger to be guarded against. Far more important is the ensuring that a sufficiency of food stuffs and cereals to prevent famine reach Great Britain from the various pastures and granaries of the world.

This work is the special duty of our cruisers, but in addition a proportion of them must attend our fighting squadrons. The "eyes and ears of a fleet" cannot be dispensed with. Wherever our battle-ships go, their scouting cruisers must go too. In peace-time, too, it falls to our ships to give ocular demonstration of the powerful and far-reaching arm of Great Britain. Powerful fleets must be ready to put in a timely appearance to second the various moves of diplomacy by what are generally termed "naval demonstrations." In the far-off corners of the earth also our colonists and settlers have to be protected against the attacks of savage tribes and the scarcely less savage officials of the small sultanates and republics that abound in out-of-the-way quarters of the globe.

We cannot afford to scatter our finer cruisers, let alone battle-ships, broadcast on these duties, so it is necessary that we should have a class of smaller, cheaper, and less well-armed cruisers and small craft for what may be termed "police duties," which in war with another naval Power would not be of any very great use in the progress of hostilities. The torpedo now being a recognised instrument of naval warfare, we of course cannot ignore it, and so must provide our fleets with a contingent of torpedo-boats for the purposes of attack, and of torpedo-boat destroyers to assist in defending our own fleets from this danger. How far, then, are our present types suitable for the numerous duties we have just indicated?

Speaking generally, it may be admitted at once that our later types, at any rate, approach very nearly to the ideal. The older types, it is obvious, cannot be expected to be well adapted to meet the various exigencies of naval warfare of to-day, as since they were built the progress of naval construction, not only at home, but abroad, has progressed by leaps and bounds, so that they may almost be said to be out of the running. Possibly, though, a certain number of them might repay some expenditure in new engines and armament with a view to fitting them for special duties.[1] For the modern ships of our fleet we are able to claim that in sea-going and sea-keeping qualities they are second to none afloat.

No men-of-war belonging to foreign Powers carry such ample supplies of coal, stores, and ammunition as do our own; in no Navy in the world is there the same homogeneity in the various classes of war-vessels.

The advantage of this last factor can hardly be over-estimated, though strange to say it seems only lately to have been grasped by our rivals abroad, who, up to quite recently have devoted all their energies to striving to produce a single ship of more than idéal perfection. The result of this system is that most foreign Navies consist of ships of widely differing types not well fitted to fight or act in unison.

This point has received but little accentuation from the events of the two recent naval campaigns, but, as we have seen, the disadvantages of fleets so composed were indicated to some small extent at the Yalu action.

On the other hand, the advantages that an admiral commanding a squadron of ships that steam at equal speeds, can turn together through

[1] See Appendix B.

similar angles, and concentrate their fire on similar bearings, do not need demonstration. It would even seem possible that by rapid manœuvring when opposed to a fleet of heterogeneous battle-ships, he might succeed in throwing them into hopeless confusion and destroy them in detail. Another strong point about our modern ships is the similarity of their armament. Compared with other Navies, the types of guns carried are but few, thus much simplifying the problems connected with the supply of ammunition not only on board, but what is even more important, at our numerous naval bases, whither in war-time our ships and our cruisers in especial would from time to time repair to replenish their magazines. These things being so, the task set to the essayist of selecting or giving his opinion on the best types is by no means an easy one. Foreign critics and others have, it is true, now and again formulated a few adverse criticisms on our designs, but on the whole the general tendency, since the introduction of our "Royal Sovereign" class, has been to copy them in a greater or less degree, so that a time would seem to be approaching when, as in the early part of the century, there will be an almost universal type of battle-ship. Imitation is the sincerest form of flattery, and so we have good cause to be satisfied with our designs when we see rival Navies adopting or attempting to improve on them while following the same general lines.

The similarity between our cruisers and those of foreign Powers is not so great, but then it must be remembered that they are built with a different object. The first duty of our cruisers, as a class, is to defend our commerce. Foreign cruisers—almost without exception, in some countries—are built to attack it, and so are constructed either with a view to speed alone and with only sufficient armament to overawe a merchant steamer, or else heavily armed and armoured in order to contend at an advantage with our own, which, necessarily, from the extent of their sphere of watchfulness, have before all things to be designed to carry an ample supply of coal and to have superlative weatherly qualities. But it will be as well now to consider our present types a little more in detail, and then endeavour in each case to suggest a type for consideration as most suitable for the British Navy.

Battle-Ships.

Our modern type of battle-ship may be defined generally as a ship of from 12,000 to 15,000 tons displacement, and 17 to 18 knots speed. Her principal armament consists of four heavy 12-inch (in the "Royal Sovereign" class 13-inch) guns mounted in pairs in strongly armoured positions on the centre line of the ship, so that one pair can fire dead ahead, the other dead astern, and both pairs on either broadside. Her secondary battery consists of ten to twelve 6-inch Q.F. guns, each in separate armoured casemates,[1] having moderately thick armour in front and thin plating on the inner sides. Her auxiliary battery is composed of a large number of 12- and 3-pounder rapid-firing guns, unprotected except by

[1] Except in the "Royal Sovereign" and "Centurion" classes, which carry six of their ten Q.F. cannon on the upper deck protected only by shields.

light shields attached to their mountings, a protection, by the way, that, to judge by the results experienced in the two recent wars referred to in the title of this essay, they would probably be at least as well without. Their flotation is protected by armoured belts of from 6 to 18 inches in thickness, from the lower edges of which spring arched armoured decks, so that practically a double cuirass is presented to the blows of an enemy's projectiles. Although there is a great apparent difference between the 6 inches of the side armour of the "Canopus" class and the 18 inches of the "Royal Sovereign," the protection afforded in each case is not to be judged by inches alone, as the improved methods in the construction of armour go far towards equalising it. There is no room within the scope of this essay to go into all the numerous important and less important differences between the "Royal Sovereign," "Majestic," "Renown," "Canopus," "Formidable," and "Cornwallis" types (the latter now under construction). It may be granted that the above general description applies to the whole set, and is the type to which we trust to maintain our supremacy at sea against any who may challenge it in the near future. As we have already pointed out, the design is undeniably a good, nay, an excellent one, and well suited to the British Navy, which, from necessity and tradition, must always expect to fight at some distance from our shores, and to which, therefore, seaworthiness, fair speed, and good coal supply are indispensable. The only points that may, perhaps, be open to criticism are the amount of protection afforded to the 6-inch guns, their comparatively small number when the tonnage of the ship is considered, and the unarmoured ends.

This latter weakness has been to a great extent eliminated in the later ships, in which, forward of the citadel, there is a wide belt of 2-inch armour which reaches to the ram and descends even below it. The after portion of the ship is still dependent on the armoured deck for its protection.

The casemate system for the protection of the secondary batteries, though it has a good deal to recommend it, yet in reality only protects effectually the guns on the side next the enemy. A projectile which passes between two casemates, unless it strikes directly at right angles to the centre-line of the ship, will in all probability pierce the thin 2-inch armour of a casemate on the opposite side of the deck and burst inside with the deadliest effect. Would it not be better to return to the continuous plating of the battery?—which would not make much, if any, addition to the weight of armour, as the extra space to be covered by the 6-inch plating would be less than the area of the sum of the inner sides of the casemates, and it would be even better to take the additional risk of placing the guns somewhat nearer together if there was no other way of economising weight.[1] "The casemate system invites the destruc-

[1] "It seemed to me that there was a true balance (between guns and armour) somewhere, so that the original system of armouring in "La Gloire" or in the "Achilles" or "Minotaur" was nearer to it than that adopted in the "Inflexible."—Vice-Admiral P. Colomb, JOURNAL R.U.S.I., April, 1899.

tion of everything on the main deck; funnels, air-shafts, ammunition tubes, and communications can be ruined, the upper deck blown up and its armament disabled, and the casemates themselves destroyed from the rear. It is obvious that isolation can be carried out much more cheaply behind side armour."[1]

In some of the later designs for Japanese battle-ships it has even been found possible to combine the complete cuirassing of the central battery with an interior sub-division of 2-inch screens, which, running fore and aft and in rear of the guns on either side, and meeting other bulkheads of equal thickness placed between each gun, not only effectually isolate them, but interpose an extra thickness of armour round the funnel casings and hatchways.

It is to be feared, however, that this great additional weight of armour must be paid for by reducing the supplies of coal and of ammunition. But to come now at once to the point of our subject: What is the best type of battle-ship for our needs?

In spite of the very plausible arguments of a considerable number of critics, it seems that however well smaller ships may suit the needs of other Navies, we ourselves must have big ships having displacements of not less than 12,000 tons.[2] They, of course, cost more to build than smaller ones; perhaps, roughly speaking, five 9,000-ton ships might be built for the price of three of our latest monsters; and when we are confessedly committed to a policy of blockading our possible enemies in their ports, numbers are very necessary.

It has been calculated that five ships would be required under ordinary circumstances to effectively blockade three opponents. But in answer to the first question, that of cost, it must be remembered that it is not only the primary cost of a ship that has to be taken into consideration; the cost of her future maintenance and upkeep must be faced.

Now, it is evident that this comparison will be all on the side of the big ship when contrasted with two smaller ones, or even if we continue to compare three with five. There will be as many officers of superior rank and heads of departments in the smaller as in the larger ship, while many more men will be required to man five 9,000-ton ships than to form the crews of three 15,000-ton vessels.

It is proposed, then, that we construct none but big first-class battle-ships, our second and third classes being provided from those of the first class that become, so to speak, superannuated by the progress of time and invention.[3] The suggested type is described below.

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[1] *Naval and Military Record*, 22nd September, 1898.

[2] "Our forefathers found a 74-gun ship absolutely superior to two frigates." Captain Mahan, "Lessons of the Yalu Fight."—*Harper's Magazine*, August, 1895.

[3] See Note in Appendix B.

H.M.S. "Ark Royal."[1] (See Plate I.)

Our proposed battle-ship is from 12,000 to 15,000 tons displacement, and in general arrangement below the water-line conforms to the "Formidable" type. The armour protection, however, is differently distributed. The main deck of 1-inch armour, and the turtle-back of 2- and 3-inch plating, remain the same. The 15 feet width of the 9-inch partial Harveyized steel belt is reduced to 8, and the belt made complete, though tapering to 6 inches in thickness when near the bow and stern. This arrangement so far gives us a small balance of weight in hand, especially when the saving of some of the 2-inch bow armour is taken into consideration. But when 6-inch armour above this, from barbette to barbette to the height of the upper deck, is added, it will be the other way. This it is proposed to meet partly by the abolition of the interior sides of the casemates, and partly by removing one heavy gun from each barbette, thereby saving the weight of the gun itself and its ammunition, and reducing the weight of the barbette and hood, which could be made considerably smaller, while the same thickness as in the "Formidable" is maintained. The four casemates at the corners of the upper deck battery are, in this design, replaced by the same number of small turrets placed in a nearly similar position, and having a frontal thickness of 6 inches, which tapers to 5 inches at the rear.

Now for the armament. As we have seen, the four 12-inch guns are reduced to two. The reason for this radical change is found in the very poor return which the biggest guns have hitherto made for the great weight imposed on the ship carrying them by themselves and their protective armour. In the secondary battery the eight 6-inch quick-firers on the main deck are replaced by the same number of Q.F. 8-inch guns, while the four small turrets on the upper deck are each armed with a pair of 6-inch weapons.[2]

The one objection that, more than all others, would appear to be most pertinent to the proposed arrangement, is the multiplication of different kinds of ammunition, but it is submitted that the record of the American 8-inch guns in the war with Spain justifies the change. The 12-pounder guns, at present without protection except that afforded from a raking fire by the casemates at the corners of the upper deck, are too valuable to be so exposed to destruction. As at present placed, the chances are that there would be few, if any, left of them after the ship had been in action with an enemy, even if she herself were comparatively little the worse for it. What, then, would she have to rely on to repulse a night attack by torpedo-boats? In the proposed design they are (four

[1] The names selected for our suggested men-of-war are Elizabethan ones not now in use.

[2] A fully automatic gun, drawing its projectiles and charges in a continuous stream from its magazine below the armoured deck, would be preferable for many reasons to a pair of 6-inch quick-firers. Mr. Maxim has stated (*Morning Post*, January 8th, 1895) that the construction of a fully automatic 12-inch gun is well within the bounds of possibility, so that a 6-inch automatic gun could surely be evolved by Woolwich, Armstrongs, or Vickers.

of them) placed in species of wells between the 8-inch guns, so as to be afforded a share of the protection of the 6-inch armour and covered above by stout cupola-like shields inclining forwards. The remaining four of the 12-pounders would not be used in a daylight action with another battle-ship, but be kept under cover of the armour and mounted in their positions at night-fall. The smaller guns, which form the armament of the fighting tops, would have to take their chance if their fire against a battle-ship or cruiser is considered necessary, and it cannot be denied that at Santiago the 6-pounders, at any rate, did excellent service. The fighting tops are to rest on a low tower-like foundation, the masts and spars above them being as light as consistent with stability. It would then take a comparatively heavy shot to bring down the fighting top, while, at the same time, the lofty and enormous masts which disfigure and even form a source of danger to many French ships would be avoided. The torpedo armament should be entirely below water, as the dangers attending the use of above-water tubes have been amply demonstrated. Two tubes should be well forward, so placed as to be able to discharge their Whiteheads well on either bow, one right aft, and one on either quarter.

After the virtual certainty of wooden decks being set on fire by an enemy's shells has been so clearly proved, their abandonment is only a matter of time. The sooner thay can be got rid of the better, though a substitute, which is entirely satisfactory, is admittedly rather difficult to find. The specially prepared non-combustible wood, which is now being used to deck some of our new ships, has the defect of being rather heavy. In the "Ark Royal," then, the iron decks are to be coated with a composition of a non-inflammable nature pressed into thin slabs containing a light steel-wire grating or network to give them additional strength and cohesion. The outside surface to be hard and smooth. This will have to be produced by pressure and rendered impervious to water.

Such a composition of the nature of cellulose or *papier-maché* should not be difficult for a chemist to discover.

The use of such a material would mean a considerable saving in weight. A further slight reduction might be made by a moderate "tumbling home" in the central portion of the ship, between the two barbettes. This would diminish the weight of the upper and main decks, and add to the stability of the ship. It is the great "tumble-home" of the sides of the famous French cruiser "Dupuy-de-Lôme" which alone enables her to bear the burden of her huge cuirass. But forward and aft of the citadel the sides will be the same as in the "Formidable," as the "tumble-home" would here not increase her weatherly qualities, and, moreover, would reduce the roominess and hence the accommodation for the officers and crew. "Habitability" is a most important point to be attended to in the construction of our ships of war. The long voyages which have to be constantly undertaken by them in the ordinary course of the world-wide duties which fall to their lot, and the cruising and blockading work which would employ them in war-time, render the comfort and well-being of their officers and men an important factor in

the Navy's effectiveness. For this reason in all the larger classes of the types here suggested, the usual scuttles on the main deck are replaced by ports which will admit a larger amount of light and air. That ports are harder to secure in bad weather and more liable to leak is an objection which could surely be overcome by improved appliances.

Turning now to the below-water sub-division by water-tight bulkheading, which is of so great importance, and which in more than one instance in the history of our fleet since its introduction has failed to do its work. In the "Ark Royal," except in one or two places where rushes of men must be provided for or large and bulky articles have to be frequently passed through, the only means of communication between the various compartments is by means of automatic water-tight doors. A door of this type has been patented by a Scotch inventor. It consists of an inner and outer cylinder, the latter built into the bulkhead and having two opposite doors, the former revolving within it and having but one door. One door in the outer cylinder or casing is thus always closed. To pass through, the inner cylinder is revolved by hand till its door coincides with the nearer one. On entering, it is again revolved till its door coincides with the further one in the outer cylinder, when egress is obtained. Doubtless other equally good or even better systems could be devised, the all-important point being that whatever the type of door, it should always automatically close itself and be impossible to leave open. The frames of these doors in the "Ark Royal" are not rivetted into their places in the bulkhead, but fastened by bolts and nuts, so that if at any exceptional time freer passage than ordinary is necessary, they can be taken out and replaced. Nothing has been hitherto said about the engines, as the experiences of the Chino-Japanese War and that between Spain and the United States do not teach us any particular lessons in this connection, beyond the obvious one that where good machinery gets into the hands of people like Spaniards and Chinese it cannot be depended on for any time at all, as it very soon gets ruined for want of proper care and attention. Thus the Spanish cruisers at Santiago, all new ships, were on paper quite capable of running away from the slower ships of the Americans, but the records of that engagement show that they were being overtaken by them all through as soon as the latter had a full head of steam. Of course, the foulness of their bottoms had a great deal to answer for, but we may be quite sure that the engines were not giving anything like the speed that their trials promised.

The engines, then, of the "Ark Royal" and other types of men-of-war here suggested will follow the general lines of those now in use in our later battle-ships, cruisers, and smaller craft, whose records in speed and steaming powers are so satisfactory when compared with those of other Navies, and which the engineering talent of our nation will steadily improve. The water-tube boiler has come to stay, in spite of the great opposition it has met with in various quarters, and so will be fitted in all cases. She will be provided with the double screws which are now almost universal in our Navy, as the triple screw, a recent innovation which finds many admirers among foreign nations, and has been adopted in many of their

newest men-of-war, does not seem to have proved its superiority to a sufficient extent to warrant any change, especially when the great additional weight of another set of engines is considered.

This almost completes the sketch of the proposed battle-ship, though some particulars as to fittings and equipment must be added. The number of flying bridges, with their supporting stanchions and other hamper, will be reduced to the smallest limit. A portion of the decked over part of the upper-deck battery at either end of the superstructure will be railed off to serve as the fore and the after bridge, and there will be a gangway along either side from one to the other. The search-lights will be placed aloft, in the stern-walk, and at the corners of the upper-deck battery. The last four will be placed immediately behind the four small turrets at its angles, and fitted on telescopic standards so that they may, to a considerable extent, be protected from damage during a day-light action (when they would be of no use) by being lowered behind the two thicknesses of armour presented by the turret walls. The anchors will be of a pattern which will allow of their being hoisted straight up until their stocks run into the hawse-pipes, as is done in most mail-boats and merchant steamers and in the newest French and German men-of-war. This would avoid the tremendous business of catting and fishing the anchor, which takes so long and employs so many hands whenever the ship gets under way, nor would there be any chance of their being interfered with by the blast of the heavy bow gun.

A species of overhanging derrick constructed of light steel spars, which can be disconnected and sent down before going into action, if considered advisable, is provided for hoisting the boats in and out. It traverses round the edge of the after fighting top by means of gearing actuated by an electric motor. Of course, a certain number of davits could be carried in peace-time so as to provide for getting out several boats together, but these could be landed on the outbreak of war, except one pair for the lifeboat.

Electric motors are to be provided for the working and manipulation of the main armament and for the ammunition hoists. Whatever may be the advantages or disadvantages of this system as compared with hydraulic or steam machinery, the fact that power is transmitted by wire instead of by piping would seem to be a good and sufficient reason for its adoption in a man-of-war. A cut wire could be insulated, by means of switches placed at intervals for the purpose, and repaired in a few minutes, but the mending of a broken pipe is not quite so simple a matter. As to its advantages in training turret guns, Lieutenant W. R. Rush, of the U.S.S. "Brooklyn," in the late war, says, in the course of a report on electric turning gear:—"To anyone who has trained turret guns upon a target by electricity, and who has afterwards attempted to do it by any other means, the contrast is too striking ever to be forgotten. The electric motor and controller give perfect control and fineness of train to an ideal degree." The fire-mains are entirely below the protective deck proper, except inside the citadel. They ought not to be required either within or without it if the ship is rendered as uninflammable as is intended, but connections for

hoses are placed at a few places on the decks and at the fore and after armoured bulkheads.

Although useless when under way, the protection afforded by torpedo nets when at anchor is too valuable to be abandoned, at any rate by a battle-ship. The "Ark Royal," then, is to have a full net defence, which is to be kept, when not in use, on a species of light shelf running round the outside of the ship, each net opposite the position where it will be required to be attached to the booms. The latter will have their outer ends secured just below the shelf. This will enable the nets to be easily attached and swung out into position. If some system of light iron brackets, attached to the ship's side, and folding close to it when not required, can be devised sufficiently strong to support the booms without the use of multiplicity of stays and guys, can be invented, the fire of the guns will be in no way impeded. As soon as the net defence is in position, the tackles used in getting it out could then be removed.[1]

CRUISERS.

"The British cruisers are essentially sea-keeping ships, standing well up out of the water, and having good speed, a liberal coal supply, and generous berthing accommodation for the crew; but it must be confessed that in the main the vessels appear to be undergunned, the armament in many of the vessels being light in proportion to the displacement."[2]

The foregoing is an American criticism of this portion of our Navy, and the facts therein stated can hardly be controverted. But while it may be admitted that the cruisers in question are by no means so heavily armed as are many foreign cruisers of equal or even less tonnage, yet it must be remembered that this numerically inferior armament is deliberately provided after the relative values of coal supply, ammunition, and speed have been carefully considered and weighed. A commerce-protecting cruiser, spending weeks and months in mid-ocean looking after our great trade routes, must be always ready for action, not only one action, but, it is hoped, many, before it is necessary for her to return to a dockyard. Without coal, therefore, she could not remain on her station, or go at full speed in pursuit of the prowling cruisers of an enemy. Without plenty of ammunition she would be useless after one or two engagements. More guns necessarily mean more weight, which must be taken either from coal, ammunition, or protection, so that the supply of powder and projectiles may be doubly curtailed. It may, of course, pay an enemy to build a cruiser with very little coal capacity in order to give her a battery which might by the torrent of its fire quickly overcome that of a less heavily armed ship, for it would not generally be necessary for her to be so long at sea. A sudden dash into one of our trade routes, a few captures, and then back to port with her prizes, would be her game. She would have,

[1] A proportion of rifle-calibre Maxims and field guns for landing purposes will, of course, be carried by the "Ark Royal" and by all classes of the ships suggested.

[2] *Scientific American*, 10th December, 1898.

of course, also, in all probability to take the risk of being intercepted by our cruisers, or perhaps our blockaders, on her return journey, and for this emergency her heavy battery is provided. The cruiser, then, that we specially require for the express purpose of protecting her commerce must have all the good qualities referred to in the American criticism just quoted, and, as she must carry a comparatively moderate armament for her size, this must be amply protected and also the ship herself, as far as possible, after her speed, coal supply, and ammunition have been provided for. That this can be done cannot be doubted, when the lightly armed and armoured monsters "Terrible" and "Powerful" are compared with the new "Drake" class, which carry four more 6-inch guns, are far better protected, and steam 23 knots to the formers' 21. The following is a description of the proposed "commerce protector."

H.M.S. "Nonpareil." (Plate III.)

The displacement of this ship is to be from 12,000 to 15,000 tons. In outward appearance she is to be assimilated as closely as possible to a big mail-boat, not only in order to give her a better chance of approaching an enemy's cruisers without arousing suspicion, but also to create among them a feeling of caution when coming up to a mail-boat which may, to some extent, favour the latter's escape. There is nothing a "commerce destroyer" or "pirate" wants less than a fight, and in the nature of things, the longer their commanders and crews go on with their special *rôle*, the more anxious they themselves become to escape capture or destruction. This point, then, is an important one, and should be carried out so that the ship will stand a minute scrutiny through the glass even at a moderate distance. No military tops are then possible, and the funnels should preferably be two only in number, though three might in some cases be permissible, as a few mail-steamers carry that number. The armoured shields of the 8-inch bow and stern chasers must be concealed by, or made to resemble, the ordinary deck houses of a mail boat. If to do this it is necessary to build actual wooden fittings upon the shields these should be of uninflammable wood and made as light as possible, and either removable or to revolve with the guns. The guns themselves might be partially withdrawn downwards when not in use through an opening on the inner side of the barbette, over which they are placed so that their muzzles would be concealed by the deck-house casing.

The embrasures for bow fire of the two foremost guns on the main deck to be concealed by carefully fitted and easily lowered light iron screening. All port-lids should be as inconspicuous as possible and the lines of scuttles continued over them by dummies where requisite. The cuirass of the ship is to consist of 6-inch armour throughout. The belt will be 6 feet in width, and there will be a 2-inch armour deck springing from its lower edge. The armour will be continued up to the upper deck in the central portion of the ship, entirely enclosing her battery, which is to consist of two 8-inch Q.F. guns and sixteen 6-inch quick-firers.[1] As

[1] Unless a 6-inch fully automatic gun can be designed as suggested in a note on the battle-ship "Ark Royal," in which case ten would be ample.

in the battle-ship, the crews of the 12-pounders, of which there are to be sixteen, are to be partially protected by the armour plating and provision made for keeping some in reserve for night work, though in a cruiser of this kind there will, as a rule, be little chance of being attacked by torpedo-boats. She will have her sphere of usefulness generally in mid-ocean far beyond the radius of torpedo craft. The same arrangement as to anchors, absence of woodwork, automatic water-tight doors, electric motors, etc., as is indicated for the battle-ship, are to be followed in the cruiser.

It will be doubtless observed that in this design the 8-inch Q.F. gun supplants the 9·2 weapon which occupies such a prominent place in the armament of our present cruisers. But it is considered that for cruisers, which are not intended to engage battle-ships (unless, under favourable conditions, antiquated, ill-armed, and slow types), weight for weight the 8-inch gun offers many advantages over that of larger calibre. Two weigh comparatively little more than one 9·2-inch gun. Their penetration is but little less, and their rate of fire out of all proportion more rapid. If we could imagine two vessels (protected by the heaviest armour now carried by cruisers, and in every respect equal) armed, the one with a single 9·2-inch gun, the other with a single 8-inch Q.F. weapon, is it to be denied that the latter would stand first in the betting on a duel between them? If we double the 8-inch guns in the one, victory would be almost a certainty for the ship carrying them.

In the events of the two recent wars which we have considered, the weight of evidence goes to show that the damage done by the explosion of the largest classes of shell does not so very greatly preponderate over that attributable to those of medium size.

Other Cruisers.

We cannot, of course, afford to have the whole of our cruisers of equally large size as the special commerce-protectors above described, and they have, as we have already pointed out, other duties of great importance, and to fulfil these we must have them of various sizes and types.

One of their most important duties is that of scouting and working in unison with a fleet of battle-ships in the same way that cavalry act in order to supply an army with intelligence and to prevent its movements being too early discovered or surprised by the enemy. For this it would at first sight appear that very moderate dimensions might suffice; but though, if their coal-carrying capacities and speed were good, they would be able to perform a part of this duty, they must also be powerful enough to give a good account of any of the enemy's cruisers that may endeavour to obstruct them in their scouting. If uniformly small and weakly armed, a few more powerful opposing cruisers might break through their screening line with comparative ease, destroy some of them in detail, and reconnoitre the main body of the fleet at their leisure. Some cruisers of considerable fighting value will, therefore, be indispensable, besides others of less size and power. But in every case, bearing in mind the lessons of the two recent naval campaigns, and the great improvements in the impervious-

ness of armour, the protection of the guns' crews should be one of the first considerations, even if the armament should have to be slightly reduced in power, and the coal supply encroached on. The latter, however, must be approached with the greatest caution. Still, it must be remembered that though it is admitted that our ships must have sea-going and sea-keeping qualities in advance of those of other nations, they yet have a series of coaling stations which far outnumber those of any other power, to fall back upon to fill their bunkers and magazines. As regards the armament, "staying power" is a quality which cannot be over-rated. If their guns' crews are effectively protected, and the remainder of the ship rendered practically incombustible, they should be able to give a good account of a much more numerously gunned opponent, if the majority of her weapons are without substantial armoured protection.

The following are suggested as types for our future first, second, third and fourth-class cruisers :—

H.M.S. "MER HONOUR," FIRST-CLASS CRUISER. (Plate IV.)

To have a displacement of 9,000 to 10,000 displacement, with a speed of 22 knots. Complete belt and citadel of 6-inch armour. The belt tapers to 4 inches at the ends. The citadel armour is brought up above the upper deck to protect the lower portion of the six 6-inch and four 8-inch Q.F. guns forming the upper battery. The upper portions of these are protected by heavy curved shields revolving with the guns. Six 6-inch Q.F. guns are on the main deck. There are also eight 12-pounders and six 3-pounders. Coal supply, 800 tons. Five torpedo-tubes, two forward, three aft (one on either quarter and one right astern). There are two military masts similar to those of the "Ark Royal." Equipment and fittings similar to those of that ship.

H.M.S. "GARLAND," SECOND-CLASS CRUISER.

To be of 5,000 to 6,000 tons displacement, with a speed of 20 knots. She is to have no belt, but a protective deck $1\frac{1}{2}$ inches on the flat to 3 inches thick on the slopes outside the citadel, 2 inches on slopes within. Citadel to be of 5-inch armour to above level of upper deck as in the first-class cruiser. Her armament to consist of two 8-inch and eight 6-inch Q.F. guns, six 12-pounders and four 3-pounders. Coal supply, 500 tons. Three torpedo-tubes, one on either bow and one right aft. To have one military and one pole mast. Details of equipment, water-tight doors, anchors, boilers, etc., as in other classes.

H.M.S. "SHEARWATER," THIRD-CLASS CRUISER. (Plate V.)

To be of 2,500 to 3,000 tons displacement. To have an armoured deck 2 inches thick on slopes, 1 inch on flat. The citadel and barbette to be of 5-inch armour. Armament to consist of six 6-inch Q.F. guns, eight 3-pounders, and three torpedo-tubes, one on either bow and one right aft. Coal supply, 250 tons; speed, 20 knots. Details of equipment, etc., as in already described types.

H.M.S. "FORESIGHT," FOURTH-CLASS CRUISER. (Plate VI.)

These are for police duty, despatch work, etc., and are to take the place of the torpedo-gunboats, which have not been a conspicuous success. They are to have a displacement of 1,500 to 2,000 tons, and a speed of 20 knots. They will have an armoured deck amidships for the protection of the engines and magazines, and will carry as armament two 6-inch Q.F. guns protected by 4-inch armour, four 3-pounders, and two torpedo-tubes, one on either bow.

This completes the list of proposed types of cruisers, and brings us to torpedo-boat destroyers, torpedo-boats, and other small craft in which no alterations are suggested. The two first in especial seem particularly suited to the needs of the Navy as they are.

TORPEDO-BOAT DESTROYERS.

The present types have turned out so well, that we cannot do better than continue to evolve them on the same lines, unless the turbine system of propulsion, now in an experimental stage, should become a definitely established success.

TORPEDO-BOATS.

No greater divergence from our later types is called for, or would be desirable. Perhaps in the larger classes, with the increased toughness of modern armour, a shield might be provided for the engines and boilers. As in the case of the destroyers, the turbine system may eventually revolutionise their propelling machinery.

OTHER CRAFT.

The different types already described should, one would imagine, be sufficient to provide for the carrying out of all duties which may be required of our Navy. The special river gun-boats lately designed and built appear excellently well adapted to the purposes for which they are constructed, and would be hard to better when it is remembered that all have to be made in sections, which must be easily transportable and readily fitted together.

SUBMARINE BOATS.

These are a confession of weakness and by no means to be recommended for our own Navy, whatever foreigners may think about them. Both the Americans and Spaniards were in possession of boats of this class during the late war, but, as neither attempted to make any use of them, we may perhaps be permitted to conclude that they did not think they were worth the trouble of transporting to the scene of action.

Although a very large number of a variety of types have at different times been invented and experimented with, the results of their trials, though at the time often reported as eminently satisfactory, have never been such as to lead to their construction on any large scale. Their use, too, has been condemned for what now, perhaps, would be scoffed at as

sentimental reasons. But it may be remembered that even Napoleon, who was not particularly troubled by scruples of this kind, refused to employ the fairly successful boat invented by the American, Fulton, against the British fleet, while his admiral Décres, remarked that such craft "were only fit for Algerines and pirates."

France, however, has several in hand at present, probably more with a view of pleasing the fancy of the public than from the real expectation that they will be of any particular value to her Navy.

Concluding Remarks.

In the foregoing attempt to describe generally the various classes of men-of-war, which, in the humble opinion of the writer, seem to be most adapted to our needs, there are doubtless several suggestions as to construction and equipment which a naval architect would perhaps recognise as impracticable. Should this be the case, the criticism must of course be accepted, but this will not vitiate the contention which is made in this essay: that the main improvement called for in future types of war-vessels is the provision of adequate protection.

Protection, above all, for their crews, both from the enemy's projectiles and from the fires which, as we have seen from the records of the Chino-Japanese and Spanish-American Wars, are so easily kindled by their explosion. Few, if any, ships were put out of action or sunk by penetration at the water-line. The causes which led to the destruction of the many Chinese and Spanish ships at the Yalu, at Manilla, and at Santiago, were in almost every case the conflagrations that broke out on board, and the demoralisation of their crews by these and by the torrent of projectiles that riddled their unprotected batteries. Surely the removal of these dangers should claim our ardent attention, even if the additional cuirass required has to be paid for by reducing the number of guns carried,[1] or even, to a small extent, the coal. But this may not be necessary after all, for we find also that in practice armour is much more effective than had before been generally supposed. Add to this the recent vast improvements in its resisting qualities, and the desired protection may possibly be attained without any great increase in weight. In attempting to provide for this in the suggested types, it will be doubtless noticed, on reference to the diagrams, that the guns lie open to the criticism of being unduly crowded together. To have the gun positions well dispersed is undeniably an advantage in that there is less possibility that a single lucky shot will put more than one out of action. But is this gain sufficient to compensate for the danger incurred by leaving the most important portion of the main deck open to destruction? A complete cuirass of ample thickness

[1] If anyone knew to a certainty that a protected cruiser like the "Esmeralda," that is crammed with guns, could rush in and sink, in the first few minutes of a fight, an armoured cruiser like the "Dupuy-de-Lôme," which is clothed from stem to stern and from upper-deck to water-line with armour. . . . But no one does know that guns are absolutely supreme. At Santiago not a belt or a barbette was penetrated, and the stoutest shield that was pierced was not over 2 inches in thickness."—*Scientific American*, 31st December, 1898.

cannot well be carried. But that is what would be required if both this and the widely dispersed gun-positions are all to be protected as efficiently as the experience of the last two naval wars indicates as being necessary.

Is it not better, then, to concentrate the guns in order that a complete armour defence may be provided for them, and, instead of endeavouring to avoid danger by dispersal, boldly defy attack by adequate protection? If the flotation of the ship is also secured, and the unarmoured portion above the water-line fore and aft of the citadel rendered fire-proof, its riddling and destruction would be a matter of comparatively little consequence. No one would be in it in action, no one would be called on to leave their guns and the armoured citadel to put fires out in it; and it is possible that an enemy, recognising the futility of expending his ammunition on them, would restrict his fire as far as he could to amidships, although here the ship would be best fitted to withstand it.

In short, what, more than anything else, the exigencies of our world-wide Empire demand in the ships of its Navy is "staying power"—"staying power" not only in ability to keep the sea by means of ample provision of coal, but also in action. They should be able not only to fight once, but again at short notice. Without this power a victory might be almost as disastrous to us, in our unique position as a nation, as a defeat.

Our men, we are proudly confident from our past history, will stand firm and undemoralised under a murderous fire longer than those of any other nation.

Our ships should have the same inestimable quality.

APPENDIX A.

Notes Descriptive of Plates.

Diagonal shading (complete lines) represents exterior armour.
Diagonal shading (broken lines) represents interior armour.

Guns.

Guns marked A are of 12-inches calibre.
" " B " 8 " "
" " C " 6 " "
" " D are 12-pounders (not all shown).

Smaller guns are not marked. Total number of these is not shown, as several are to be in reserve.

Torpedoes.

Impulse tubes are marked (T).

The armour in Plate II. is not indicated, as its situation is well known, and the locality of the additional armour in the case of the "Collingwood" is easily understood from the description in Appendix B.

The ship drawings are not made to scale, but their approximate size is roughly indicated.

The "Ark Royal." (Plate I.)

The boats are supposed to be on cradles fitted with rollers running on the lines indicated, so as to bring them under the derrick as required.

Thickness of Armour.

This is indicated by the numerals upon it, which refer to inches.

Armoured Decks.

These are indicated, except those portions behind the outside armour, but not shaded nor marked with thickness. This will be found in the descriptions on pages 864-872.

APPENDIX B. (See Plate II.)

The Adaptation of Some of Our Older Battle-ships for Blockade Duties.

While advocating the construction of large battle-ships only, the necessity for the provision of adequate numbers for blockade work is not lost sight of. But while, with our general requirements and the comparative cheapness of construction in this country, it would not seem to be good policy to turn out a battle-ship admittedly inferior to any foreign battle-ship that floats, yet it is obvious that for any given expenditure we are bound to have fewer ships for our money than if some are smaller and less costly. But there are many ironclads which the lapse of years and the changes in naval construction have relegated to the second and third rank, and as time goes on there will be many more.

These, though, from their slow speed and more or less out-of-date equipment, unfitted to form a portion of a mobile fleet, could be so adapted by changes in armour, armament, or both, as to form valuable auxiliaries to a blockading fleet. Perhaps two of these, with three modern battle-ships, would be sufficient to blockade three modern battle-ships of an enemy (cruisers, destroyers, etc., would also, of course, be necessary in addition, but for the purposes of this comparison need not be reckoned on either side). They should be specially fitted to repel torpedo attack, and so would be most useful to work as close inshore as their draught would admit. Though not powerful enough to withstand the modern ships of an enemy, should they come out, they might be able to engage them long enough for the three modern ships of their own squadron to make sure of bringing them to action, which, if we may judge from the past, should be all that would be required to eliminate them from the active list of the enemy's vessels. Besides, it is by no means certain that they would have to encounter modern opponents in all cases. The enemy's older ships would be at least as likely to be blockaded in their harbours as their newer ones.

The principal alterations required would be in armament, and, in some cases, habitability and distribution of armour. Ships for this duty would, it is assumed, be chosen from those which were not considered worth the expense of new engines. If they were worth this they might, perhaps, be fitted for a time to form part of a mobile fleet. High speed, too, would not seem to be an absolute necessity. Their duties would be those of watch-dogs giving early warning of an attempt to break out on the part of the enemy, and hanging on his heels (should he do so) as long as possible. It is considered that the first object of the enemy's ships in coming out of a blockaded port would be to get clear away, so that after once passing one of these special blockading ships they would not stop to overpower her, for fear of being attacked by her more powerful consorts. This would be especially true of cruisers seeking the high seas for the purpose of attacking our commerce, and with them, while in range, old ironclads, fitted with a powerful Q.F. armament, would contend at an advantage on account of their good armour protection, which, old as it is in many cases, might yet be expected to deflect a considerable number of projectiles which theoretically and practically, under favourable circumstances, are capable of penetrating it. At least, this is what the experiences of the Yalu and Santiago point to.

Plate II. gives diagrams or rough sketches of the "Iron Duke" and the "Collingwood" as altered and fitted for this service. These two are selected as being of quite different types and ages. Possibly some of our still older ironclads, with their long armoured main decks, would be even more adapted for this work, especially if some amount of interior splinter-proof sub-division could be added. A ship like the "Minotaur," for instance, with twelve or sixteen Q.F. guns aside, would be a very ugly opponent for a passing cruiser or even a battle-ship to tackle. Her armour, though, is very thin and soft, but perhaps the removal of a portion from the ends of the battery would allow of a thin facing of the latest extremely tough Krupp armour being bolted over the central part.

The following is a short description of the alterations proposed in the two ships illustrated on Plate II. :—

H.M.S. "Collingwood."

The heavy after barbette and its guns are removed. The weight thus saved is replaced by a cuirass of modern 6-inch plating over the central battery and down to the belt. Two 6-inch Q.F. guns are placed at the after end of the citadel so formed, firing *en barbette* over the top of the armour, and covered overhead by a 4-inch shield. If weight will allow, additional habitability is obtained by raising the forward part of the ship, thus giving increased freeboard and making her more weatherly. Perhaps aft an extra deck might be added, as indicated. The present military mast, with its tops, is replaced by a low tower-like structure supporting a fighting platform and a light signal pole. A similar one is built over the conning-tower forward. Should these alterations be feasible, she would not be nearly such a "wet ship," and

so better suited for blockade work. She will be able to bring a broadside of two heavy and five 6-inch Q.F. guns to bear, and will be able to follow up an escaping enemy after passing with her two heaviest pieces. She should carry in addition as many 12- and 3-pounder Q.F. guns as can be put into her, a proportion always being kept in reserve for night work against torpedo-boats.

H.M.S. "Iron Duke."

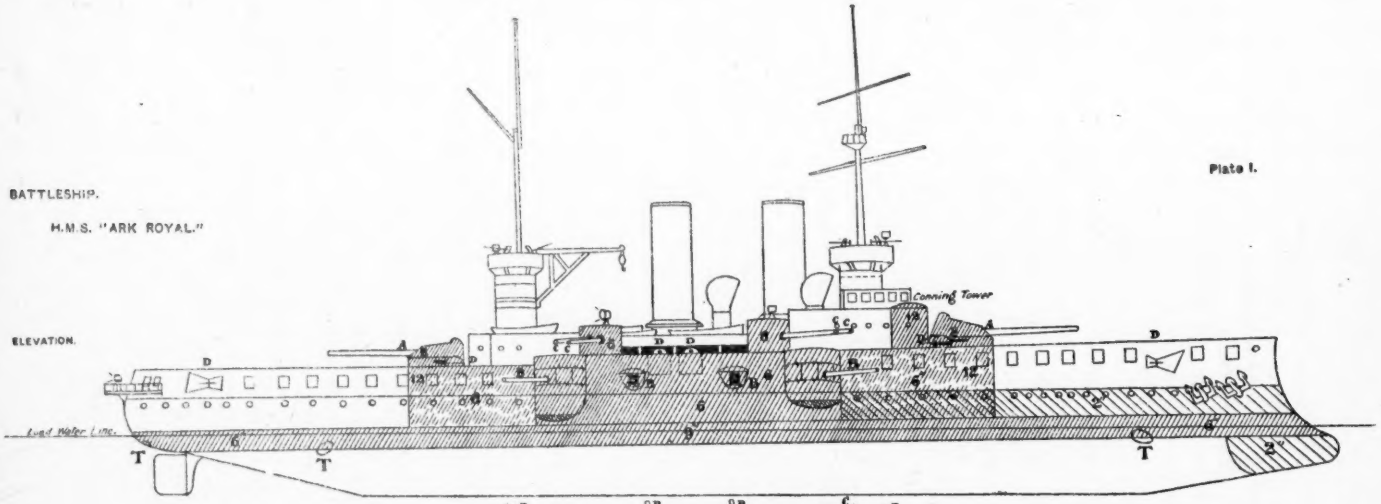
Little alteration is suggested for this ship. She has a good freeboard already. The absolutely useless (under present conditions) armament of muzzle-loading guns and the guns of a more modern type which have been placed on her upper deck are removed and replaced by twelve 6-inch Q.F. guns, an additional port being cut on either side of the upper battery, so that there will be six guns in it instead of four. They will, perhaps, be rather crowded together; but pivotted actually in the ports, as casemate guns now are, it should be possible to put in the extra two weapons. A number of ports are cut in the bulwarks forward of the battery for 12-pounder guns, and aft the upper deck is narrowed to half its width to give the two after guns a better arc of fire. Two fighting towers, with signal poles, replace her full rig.

Plate I.

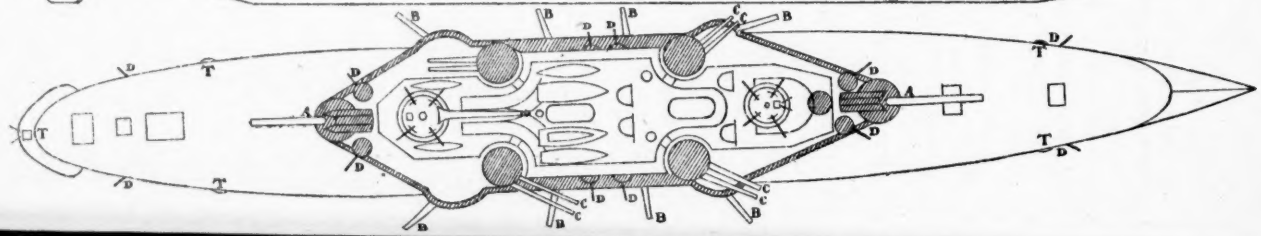
BATTLESHIP.

H.M.S. "ARK ROYAL."

ELEVATION.

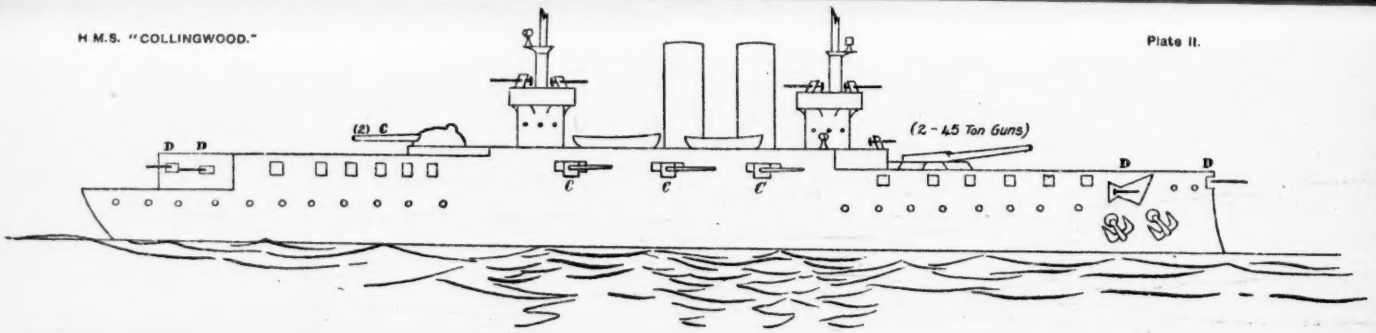


PLAN.
Upper Deck
and Armour
on Battery, etc.

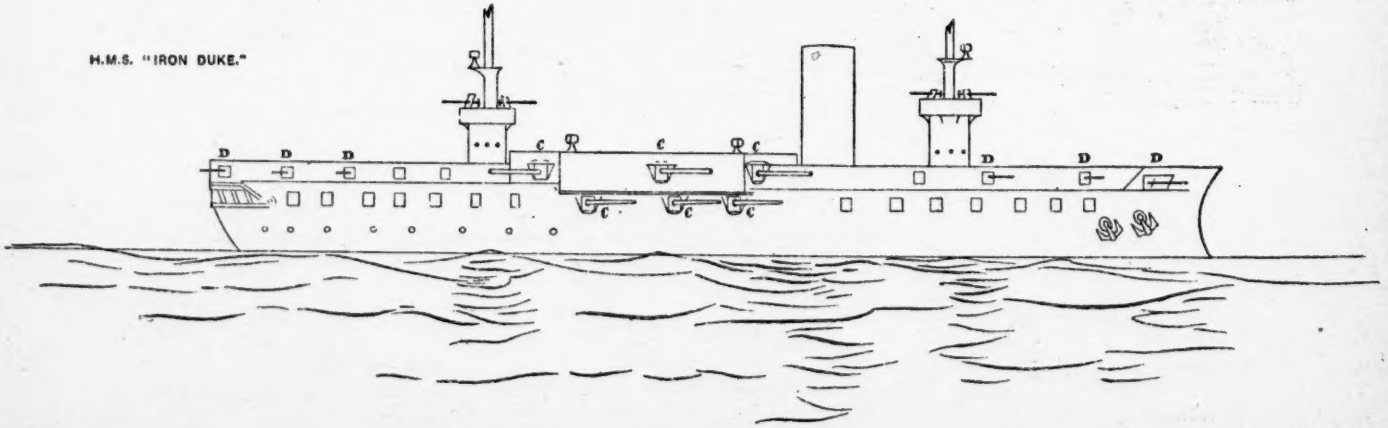


H.M.S. "COLLINGWOOD."

Plate II.



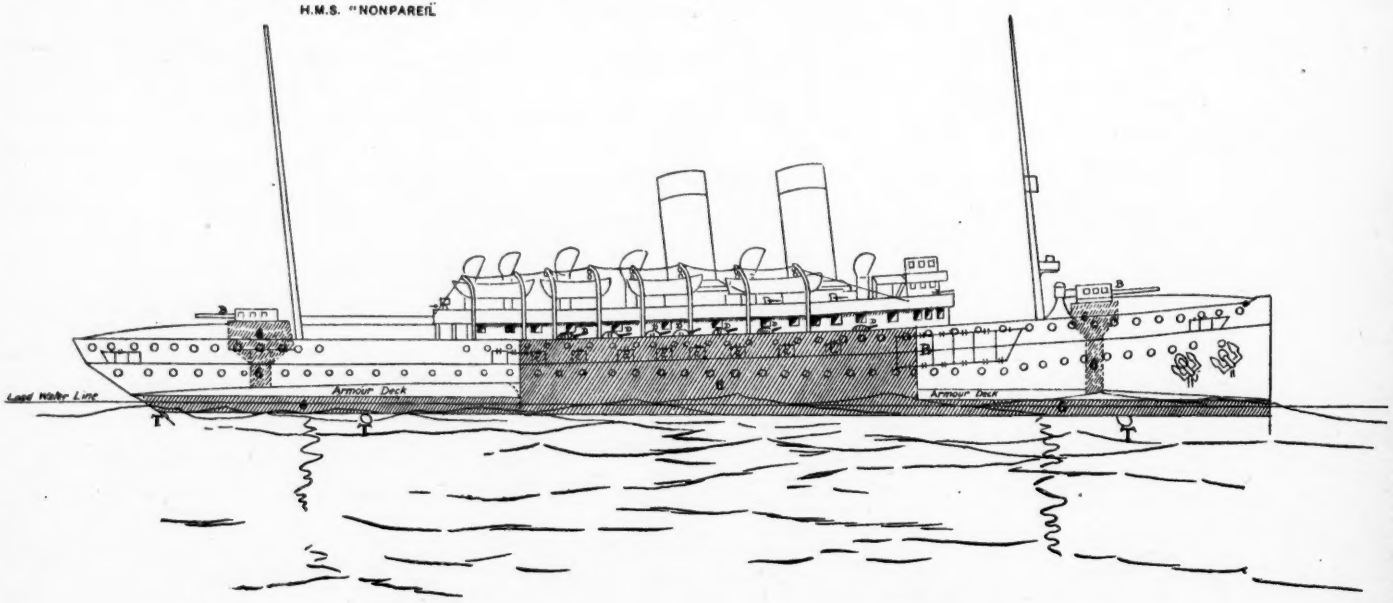
H.M.S. "IRON DUKE."



COMMERCE PROTECTOR.

Plate III.

H.M.S. "NONPAREIL"



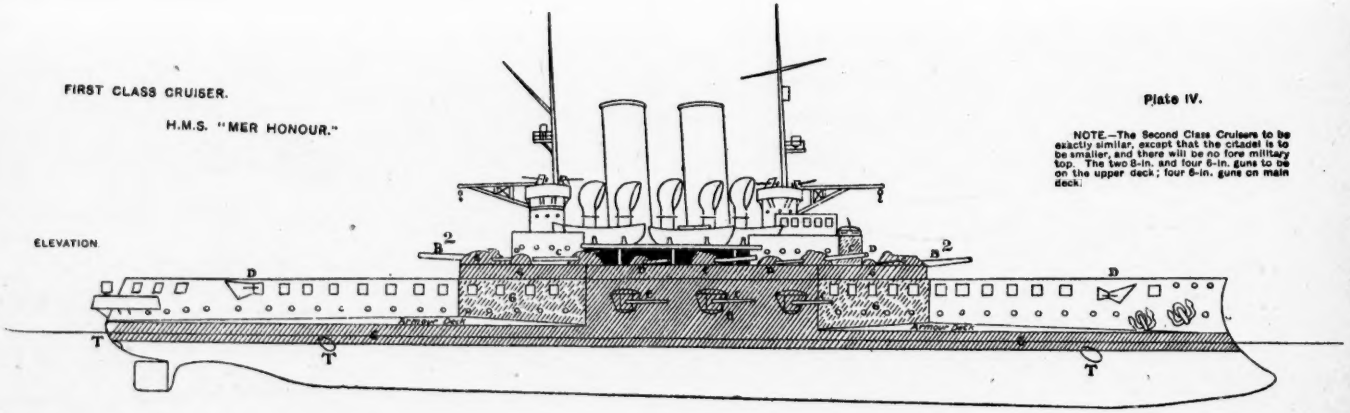
FIRST CLASS CRUISER.

H.M.S. "MER HONOUR."

Plate IV.

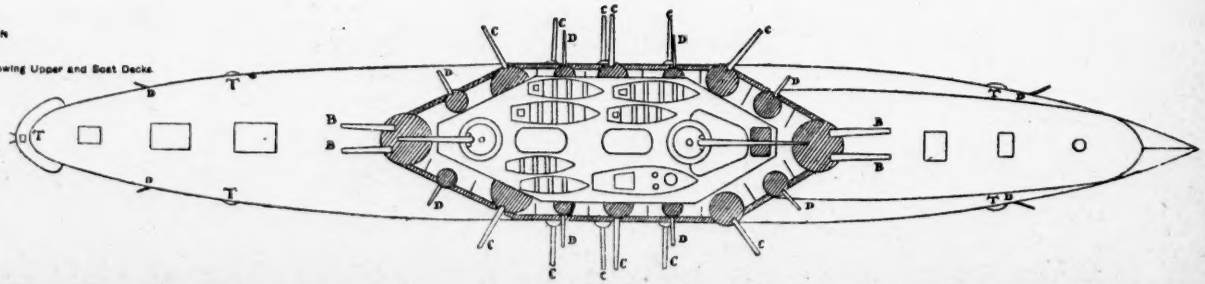
NOTE.—The Second Class Cruisers to be exactly similar, except that the citadel is to be smaller, and there will be no fore military top. The two 8-in. and four 6-in. guns to be on the upper deck; four 6-in. guns on main deck.

ELEVATION



PLAN

Showing Upper and Boat Decks

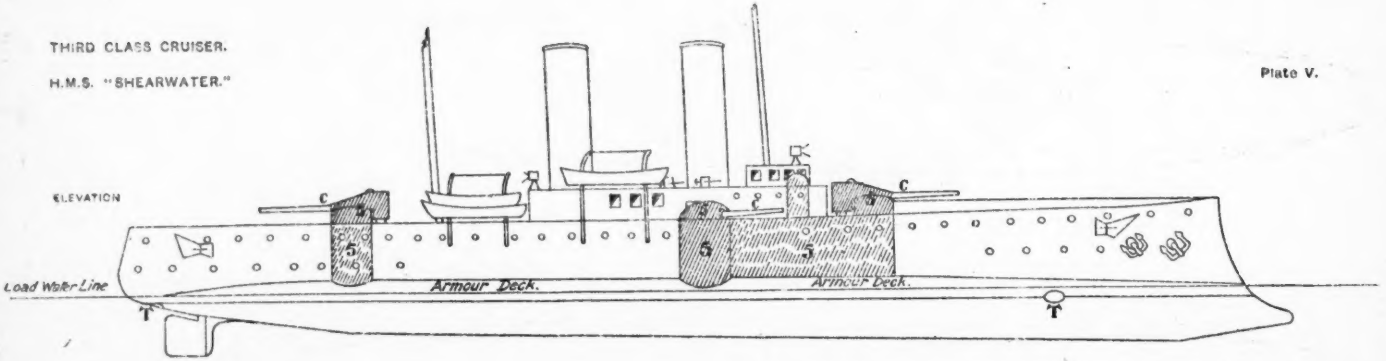


THIRD CLASS CRUISER.

H.M.S. "SHEARWATER."

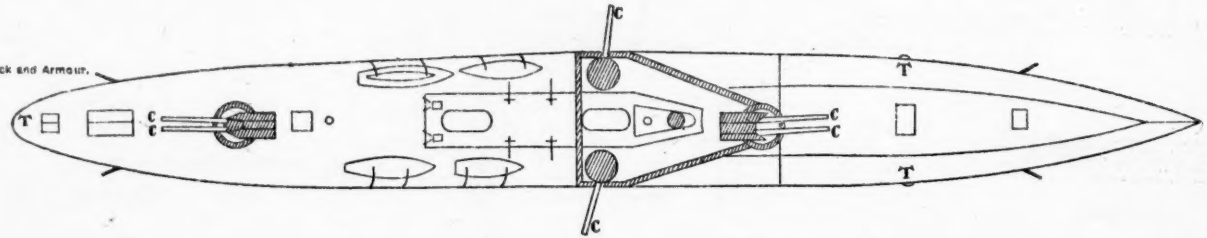
Plate V.

ELEVATION



PLAN

Showing Upper Deck and Armour.

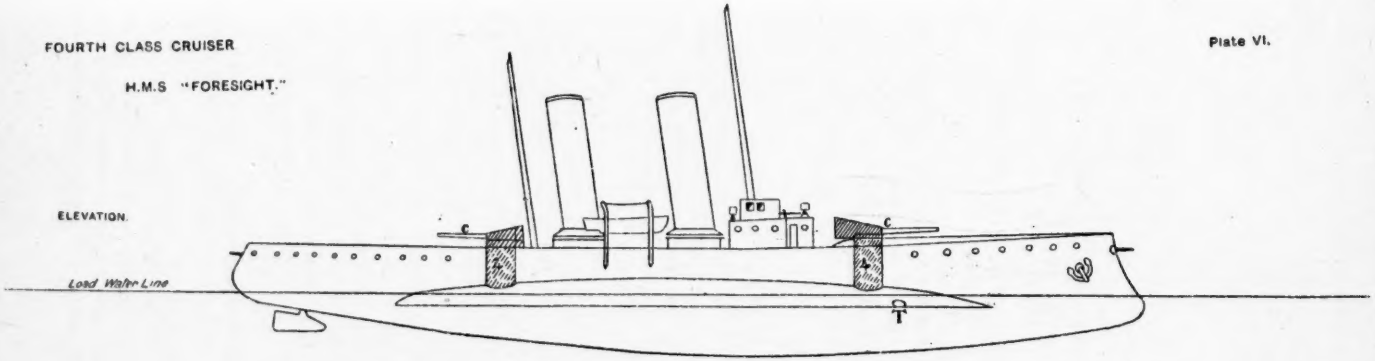


FOURTH CLASS CRUISER

H.M.S "FORESIGHT."

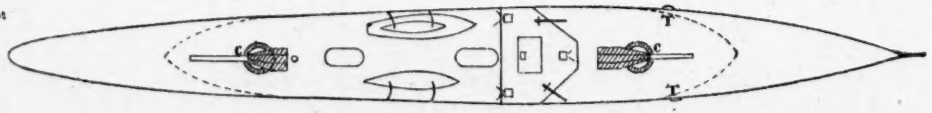
Plate VI.

ELEVATION.



PLAN

Showing Upper Deck and extent of Armour Deck.



SHIELD PROTECTION FOR TROOPS IN THE FIELD.

By Captain A. D. FURSE, late 2nd West India Regiment.

Friday, 2nd March, 1900.

THE subject upon which I have the honour to address you to-day, namely "Shield Protection for Troops in the Field," has attracted a great deal of attention in our country during the past few weeks; in fact, since the news first reached us of the fierce fights on the banks of the Modder and the Tugela. The Press took up the subject, and then the War Office was for a time inundated with suggestions, drawings, and plans of bullet-proof shields without number, possible and impossible. The members of the Army Board, called together for the purpose of discussing and deciding the question, seem to have arrived at the conclusion that no shields should be sent to the troops in South Africa. There are, no doubt, some very good reasons why such a conclusion should have been arrived at, and we must bow to the opinion of the experienced experts who compose the Army Board. Yet to the uninitiated, especially in view of the recent official despatches from the seat of war, it seems regrettable that such a decision should have been taken. The conclusion arrived at by the War Office authorities does not, however, mean that the question of bullet-proof shields is to be shelved for ever; especially if, as seems to be the case, the Continental Powers have long ago adopted, and laid in store ample supplies of such useful commodities. The question of shields for infantry in the field is still an open one, and I shall crave your indulgence for endeavouring to submit to your kind consideration my arguments in favour not only of the utility, but of the absolute necessity of such an addition, in the immediate future, to the train of our armies in the field.

In order to explain my subject all the more clearly, I shall beg leave to classify my subject matter into two distinct parts; in the first, I shall endeavour to show the necessity of adopting some method for procuring cover from fire for infantry in the field; the second part will treat of the qualifications which such artificial cover should possess; it will try to show the feasibility of procuring cover endowed with these characteristics; and in it I shall venture to offer a few suggestions of a practical nature as to

the kind of artificial cover which, with due deference to your greater knowledge and experience, I should consider best adapted for the use of troops in the field.

Necessity of Artificial Cover.

And now let me first of all endeavour to prove the necessity of artificial cover for infantry in the field. When I say "infantry," I naturally mean attacking infantry. In the heading to this paper I have said "for troops in the field," because there is really no reason why such cover should not be extended at times to mounted infantry, or even cavalry. But it certainly refers mainly to infantry.

Unaccustomed as we were to fighting an enemy armed with modern weapons of precision, and gifted with a knowledge of the best way of using them, the long lists of casualties suffered, perhaps somewhat unnecessarily, and the repeated checks sustained on the hard-fought battle-fields of South Africa, came to the generality of our people as a shock and a surprise. Yet, under the circumstances, such a result cannot have come totally unexpected, as it had not been unforeseen by thinking military men.

I shall not speak here of the low estimate which the majority of the people in England had erroneously formed both as to the numbers and the fighting qualities of our enemies. I shall restrict myself entirely to tactical considerations.

Every soldier, and, in these days of trained Volunteers, nine civilians out of ten, are fully acquainted with the ordinary advantages of the defence over the attack. The defenders have the advantage of an elbow-rest in firing, they are under cover, they have an almost inexhaustible supply of ammunition ready to hand and also under cover, while the assailants fire at practically unknown ranges that continually change in the vicissitudes of the advance, and at an enemy that is all but invisible; their aim is bad because they are at the time fully exposed to the fire of the defenders; their ammunition runs the risk of being exhausted just at the critical moment, it being difficult and dangerous to bring the reserve ammunition up to the firing line.

These were, until recently, some of the ordinary advantages of the defence over the attack. The adoption of magazine rifles and smokeless powder has enlarged the list, always in favour of the defence. If the defenders were almost invisible before, owing to their shelter trenches, parapets, and head cover, the smoke of their rifles at least betrayed their position. But now even that shred of comfort is taken away from the assailant. This is what the war correspondent of one of our daily papers, namely Mr. Julian Ralph of the *Daily Mail*, says, writing from Modder River Camp:—

"One of the most interesting and formidable of the new conditions of war which we are experiencing is that we never, or next to never, see our foe. Can the student of war, or even the casual reader, comprehend what it means to go on for week after week, and month after month,

fighting an invisible enemy? Personally, I saw a few score Boers running away at Belmont, a smaller number escaping from the punishment we were meting out to them at Graspan, and several hundred showing themselves, with uncommon impudence and courage, before the beginning of the battle at Modder River. But I have no doubt there are men in our Army who have never seen a Boer in battle. I know of officers who have only seen one or two in one battle, and five or six in another. In engagement after engagement, our men have thrown themselves upon the veldt, moved to do so by a hail of bullets around them, and then have fired away for hours at a time at the noise or the flame of the enemy's fire in trenches which they could not see. This is true to such an extent that at Modder River there were whole battalions of ours that did not know at the end of the day whether the enemy was north or south of the river."

And in another place, he adds:—

"With the introduction of smokeless powder, a foe entrenched, or hiding behind rocks, is a foe invisible. And it takes a tenfold stouter heart to fight an unseen enemy than to combat with a substantial line of flesh and blood beings, or a leaping, running target of brown smoke which locates it."

But all this was not new to us before the war. Newspaper correspondents had given us their experiences at the annual manœuvres on the Continent, and suggested what we might expect. In Major-General Clery's work on "Minor Tactics," one of our text-books for military examinations, a special chapter is devoted to smokeless powder, and it shows that practically all the advantages of this innovation are on the side of the defence. It points out that the difficulties of reconnoitring by the attacking force would be rendered in future extremely arduous, for it would be almost impossible to locate the defenders, as there would be no smoke to betray their position after they had delivered their fire; the attacking force, no longer sheltered behind a dense cloud of smoke, would have to advance in the open, plainly visible to the enemy, who, having carefully measured all the distances, and marked the various ranges, would be able to pour a destructive fire on the assaulting columns, and even on their reserves.

The forecast in Major-General Clery's book has been amply fulfilled. Time after time the Boers, possessing a thorough knowledge of the country, have chosen strong positions athwart our line of advance, constructing miles of entrenchments behind which to conceal themselves, and concentrating the fire of every gun and rifle at their disposal on the zone of the advance where every range was carefully marked.

There is nothing new in all this, it is simply the carrying out of the most elementary principles of tactics as explained in our own drill-books. Yet we have thought of nothing better to oppose to these common-sense tactics than to hurl our men blindly at our foes, with the pitiable result that often the storm of bullets has been found too deadly for any men to face; and when by efforts of superhuman valour our men have actually succeeded in reaching the position, our casualties have almost invariably

been unnecessarily heavy, and out of all proportion with the losses of the enemy, who, on the near approach of our men, have beaten a masterly retreat, and defied pursuit.

I must beg to be excused for dwelling longer than I should on certain general principles and facts on which you certainly do not require to be enlightened, but which pave the way to the conclusions at which I wish to arrive.

Now, let the ordinary advantages of the defence be added to those newly brought about by the adoption of accurate, long-range magazine rifles and smokeless powder, and it will be seen that, under such circumstances, it should not be difficult for a force successfully to resist the attacks of vastly superior numbers: for the assailants are fearfully handicapped.

To form some idea of the terrible disadvantages to which our attacking troops are exposed in South Africa, we have but to glance at the official reports of our generals at the front.

In his despatch of the 23rd November, 1899, from Enslin, Lord Methuen thus expresses himself:—

"My sole regret is that I have lost, and must lose, many men whenever I have to fight large numbers of mounted Boers in strong defensive positions."

And General Buller, writing from Chieveley Camp on the 16th December, 1899, says:—

"At Colenso, on the 15th December, the detachments serving the guns of the 14th and 66th Batteries, Royal Field Artillery, had all been either killed, wounded, or driven from their guns by infantry fire at close range, and the guns were deserted."

And further on:—

"These orders were admirably carried out by the Royal West Surrey and the Devonshire Regiments; but Fort Wylie, which had been silenced by the fire of the 14th and 66th Batteries, was re-occupied, and the fire was so heavy that *no troops could live in the open by the guns.*"

And again:—

"Such a deadly fire was kept up that, although several attempts were made to cover the fatal five hundred yards, either horses, or men, or both, were killed before they got to the guns."

And in yet another place:—

"A final most gallant attempt was made by Captain H. L. Reed, of the 7th Field Battery, who came down with three teams to see if he could help; and five of the thirteen men were wounded, and one killed, and thirteen horses killed out of twenty-two before they got half way to the guns. After that, I would not allow another attempt, and the guns were abandoned."

In his despatch of December 1st, 1899, from Modder River, Lord Methuen writes:—

"The 3rd Battalion Grenadiers and the 2nd Battalion Coldstreams advanced to within 1,100 yards of the enemy, lay down, and held their own. Captain Heneage tried to advance further, and lost four sergeants."

At the battle of Magersfontein, the despatches relating to which, I believe, have not yet been published, the fire of the enemy was so murderous that our men had again to lie down to save themselves from utter destruction ; but as the enemy did not retire during the night, as at Modder River, they had to.

Further on Lord Methuen says :—

" Colonel Hall (of the Royal Artillery) points out that it would have been better that he should have known the point of attack ; but the truth is that, when *no one can get on a horse with any safety within 2,000 yards of the enemy*, orders cannot be conveyed."

Finally, General Buller in his despatch of 24th January, preceding the battle of Spion Kop, says :—

" Warren holds the position he took two days ago. In front of him about 1,400 yards is the enemy's position west of Spion Kop. It can only be approached by bare open slopes. Like the Highlanders at Modder River, *they would be mowed down like grass.*"

From this it will be seen that, with modern magazine rifles and Q.F. guns, it is nowadays absolutely impossible for infantry to cross the fire-swept zone by day in front of an intelligent, well-armed, determined, mobile, and properly entrenched foe, except with a loss out of all proportion with the object to be attained.

During the early days of the campaign front attacks by infantry across the open were pardonable, nay, imperative ; for it was necessary once for all to dispel the miserable illusion under which our enemies were labouring that British troops were wanting in courage. The page of Majuba Hill had to be blotted out. The innumerable proofs of truly heroic valour given by our brave soldiers and sailors have set that question at rest long ago. But, if our troops are fearless, that is no reason why they should be uselessly sacrificed ; and we must remember that, to win a battle, superiority in numbers, as in everything else, is mostly needed at the critical moment ; therefore the men must be spared as much as possible during the preliminary phases of the attack.

Against all the advantages of the defence, the assailants are supposed to have two advantages left to them, namely, the choice of the time and place of the attack. Let us see how far this is the case in modern warfare.

First, as to time. We have seen that a front attack by day is at present almost an impossibility. It might possibly be performed by night; but leaving alone search-lights and star-shells, the sudden light from either of which might, by showing the attacking columns, give all the advantage to the defenders, we must not forget the difficulty of taking large bodies of troops over rough ground in the dark, the facility with which direction is lost during a night march, and even more so during a night attack, more especially in a country with the astronomical system of which we are not familiar, and where, owing to geological causes, the compass is of but little value. We must bear in mind the possibility of confusion and consequent panic during the *mêlée*, especially in a country

whose inhabitants are familiar with our language, our words of command, our very bugle sounds.

An advance over the zone of fire at dusk is certainly preferable to an attack in the full light of day, because the enemy cannot well make use of their artillery, and his musketry fire would be uncertain except at the very closest ranges. But, again, darkness would facilitate the enemy's retreat, were he so inclined, or a possible change of position on his part; and we have seen from recent experience to what unpleasant surprises troops advancing to the attack of an active and shrewd enemy by night are likely to be exposed—witness Magersfontein and Rensburg. Consequently operations by night are far from being safe. Certainly in the present campaign they have not proved generally successful. For small surprises night seems better suited than for operations on a large scale. So that the advantage of the choice of time of the attack does not seem to count for over much.

But the assailants are supposed to have another advantage: the choice of ground, namely the direction from which they will carry out the attack. If front attacks are so costly, why not make a flank attack? Why not turn the position?

In certain hilly countries, Northern Natal for instance, the configuration of the ground is often such as to deprive the assailants of the choice of place. However, let us see what our generals have to say on the subject.

Lord Methuen, in his despatch of the 26th November, 1899, from Enslin, says:—

"There is far too great risk of failure in making flank and front attacks in the case of a position such as lay before me at Belmont. . . . . Nor is there any question of taking the enemy in flank; as, on horses, *he changes front in fifteen minutes.*"

And in his despatch of 1st December from Modder River:—

"In no case is it a position to be turned by a wide detour. . . . Any other course (than a front attack in extended order) must be attended with great risk when opposite eight thousand horsemen with a river to assist them."

And in Natal General Buller has several times tried to outflank the enemy, but each time he has had to fight a front attack—witness Spion Kop.

Nor is it only owing to the hilly configuration of the country. For listen to what a war correspondent writes about the battle of Magersfontein.

"It is a grass and bush-strewn plain, just missing being level by reason of a few slight ridges. Had Lord Methuen rushed upon it as quickly from the Modder River fight as he rushed from one to the other of his preceding battles, he might not have been checked, because the strength of the obstacle was made in the time he gave the Boers in which to build their trenches."

And again :—

"For frontal attack the old military manuals declared that the attacking force must be three times that of the defending force. To-day, with the new weapons, it is said that ten men must attack one. But, I believe it is impossible to set the modern proportion correctly, since to all intents and purposes Magersfontein battle-field, with its series of three trenches extending twenty-five miles, is as impregnable to infantry, as Cronstadt is to attack by torpedo-boats."

The war correspondent from whom I quote is not a general officer nor a military authority ; he only professes to echo some part of what he has heard from those who were reflecting upon our experiences in this war. And Lord Methuen's long inaction in front of the Boer trenches on this grassy plain seems to show that he was pretty much of the same opinion as the war correspondent.

But it will be said that Lord Methuen's long inactivity in front of the Magersfontein position was due to insufficiency of numbers. I grant that, considering the enormous disadvantages under which an attacking force must nowadays labour. So, Lord Roberts, having collected an overwhelming force, by a swift and well-combined strategical move, has completely turned Cronje's flank, and forced him to abandon his impregnable position without our suffering any appreciable loss. Hence the question is solved : No more front attacks ; the proper way to carry a position is by cutting or threatening the enemy's line of communication. Very good ; but, may I ask, shall we always be in a position to throw an overwhelming force across the enemy's lines of communication ? We were not so at the commencement of the campaign ; and, supposing for once that we should unfortunately be in the same predicament once more, should we then be satisfied with advancing our men to within a certain range, when they would have to lie down on the veldt, and, as Lord Methuen puts it, *hold their own* there till the fall of night enabled them to find their way back to camp ? Neither our men nor our generals can do impossibilities. In the absence of an overwhelming superiority of numbers that would enable us to outflank the enemy, some means must be devised to enable our troops to advance to the assault in lieu of lying down, wasting ammunition, and waiting.

But let us follow Lord Roberts in his invasion of the Orange Free State. The Boers, finding their communications threatened, have hastily retreated in search of another position. Had Cronje trusted less to our proverbial slowness, and had his Intelligence Department served him better, he would have commenced his retreat earlier, and his oxen would not have broken down with fatigue.

Let us, however, take things as they are, and let us read Lord Roberts despatch of February 21st, 1900, from Paardeberg.

"Yesterday afternoon," he says, "I was satisfied by a careful reconnaissance in force of the enemy's position that *I could not assault it without a very heavy loss*, which I was most anxious to avoid.

"Accordingly I decided to bombard him with artillery, and to turn my attention to the enemy's reinforcements."

What is this? I thought we had turned the enemy's position, and we are actually facing his position once more.

A Reuter's telegram of February 20th from Paardeberg Drift says :—

"On Sunday the British forces fought *one of the most costly* actions of the war near here. General Kelly-Kenny's division, which was advancing in pursuit of the retreating Boers under General Cronje, caught up the enemy's rear guard at Klip Drift, and followed up the Boers to where they were in laager at Koodoosrand Drift."

And lower down :—

"General Kelly-Kenny, having seized the two drifts, found the enemy, who was enclosed, and ordered his men to attack."

After some tactical details, he continues :—

"Both on the north and south banks *the ground was level*, and *the advance across it was deadly*. The battle was *an almost exact replica* of Lord Methuen's action on the Modder. The soldiers were under fire for the whole day ; but *all the fighting left the position unchanged*."

And another telegram of Reuter's adds :—

"It is somewhat difficult to explain Sunday's action, in which all our force was engaged, and in which Cronje, although in difficult circumstances, managed to hold his own."

And further on :—

"While the other regiments swung round to the front, the Highland Brigade, *on level ground, destitute of cover*, were exposed to a terrible fire, which *obliged the men to lie prone. This they did for the rest of the day*."

The Canadians made a gallant attempt to charge into the laager, but failed.

Far from me to find fault with General Kelly-Kenny's vigorous action in attacking the retreating enemy, and hold him at any cost until the arrival of reinforcements ; nor with Lord Roberts' common-sense decision to avoid further slaughter in useless assaults, and instead bombard the enemy with artillery. I only wish to point out that a strategical turning movement does not necessarily dispose of the difficult problem of the front attack. At first, no doubt, it was right for whatever portion of our force had come up with the enemy to lay hold of him, and not let him go, *coûte qui coûte* ; nor could such a force be encumbered with anything like a mantlet train. But after the enveloping movement had been completed, it is most likely that, if our men could have advanced behind some kind of artificial cover, the enemy might by this time have been forced to surrender, instead of our having recourse to the slower process of bombardment, which leaves the matter anxiously unsettled pending the pouring of Boer reinforcements into the Orange Free State.

Since writing the above, and on the very anniversary of the disaster of Majuba Hill, after days of the most anxious expectation, the gratifying news has reached us of Cronje's surrender.

Yet no more convincing proof can be offered of the necessity of shield protection for infantry in the attack than that afforded by the recent fighting at Paardeberg, which has ended in Lord Roberts' glorious victory.

While Reuter telegraphed on the 22nd relating how the various regiments surrounding Cronje's position had to relieve each other by actually crawling on their stomachs over each other's bodies, a telegram from Laffan's Agency of the same date says :—

"The big guns fired intermittently during the night, while *the Engineers were occupied in sapping the ground* in the direction of the Boer laager."

Sapping? So it has come to this, that an enemy overtaken during his retreat, and seeking shelter behind hastily constructed trenches, can only be approached by means of the sap. And why? Because, as General Buller laconically puts it, *the fire is so heavy that no troops can live in the open.*

So we have had recourse to sapping. But what is sapping? It is pushing our trenches forward under cover of a sap roller; in other words, of *a movable shield.*

A front attack will be inevitable somewhere, were it only as a feint, and to hold the enemy to his place. But for a feint to be successful it must possess many of the characteristics of a real attack. The infantry, the only arm, we used to be told, that can storm and hold a position, must advance without hesitation, and showing a determined purpose of coming to close quarters. In order to convey such an impression, the attacking troops must advance to within medium rifle range of the enemy's position, and during this advance they will necessarily be exposed to a withering fire that will cause them very heavy losses. Again, a feint should always be such as to allow of its being turned into a *bonâ fide* assault. But a concentrated shrapnel and rifle fire from the enemy will, as example teaches us, seldom allow of the assaulting columns reaching that stage without severe loss.

It used to be a maxim of tactics that the infantry attack should always be prepared by artillery, and that it was only when the enemy's artillery, and partly also his infantry, had been silenced, that the assailing infantry was to be ordered to advance to the attack. Here also a change has come over the scene. These maxims might have done very well a few years ago, but evidently they were not meant to meet the progress of modern invention, nor the resources of the wily Boers. We know what reliance can be placed in the repeated announcement that "the enemy's guns have been silenced." Notwithstanding our "excellent practice," as soon as an opportunity offers, they are blazing away again as merrily as ever. As to their infantry, they have been lying *perdus* as if the position had been abandoned, or our lyddite had reduced every one of its occupants to "red dust"; but they suddenly wake up from their slumbers just as the order to advance has been given to the storming columns. The fact is, that the range of guns has been so much increased that the great distance allows the enemy to watch the progress of the shells along their trajectory, and to take cover in their shell-proof trenches before they strike. And as to silencing their guns, these appear to be placed on disappearing mountings, and it is only by a fluke that any can be disabled, as they disappear under ground the moment they are fired. We have before us an exceedingly

crafty and mobile enemy who will often allow us to reconnoitre him, and even to pass by his hidden outposts, in order to deceive us; who will keep as quiet and invisible behind his rocks, or his grass-sloped trenches, as if there were no enemy there at all; and who, if a lyddite shell happens by mishap to fall uncomfortably near him, will swiftly decamp to other quarters more safely ensconced in his immediate rear, as swiftly to resume his post as soon as our guns have been masked by the advance of our own infantry. Nor are these tactics his exclusive property. Any one of our enemies may fight us in the same manner.

Is there then no other way to meet our slippery foe, and to come to close quarters with him than to advance against him uncovered along the death trap which he has so obligingly laid for us? Not so; an expedient must be found to carry our infantry scathless, or nearly so, through the fire zone up to their trenches, or to the foot of those kopjes where our assaulting columns, finding natural cover, will be more on a footing of equality with the enemy, nay, of actual advantage, owing to our proved superiority in a hand-to-hand conflict.

Description of Cover Needed.

And now we have come to the second part of my thesis, namely, the qualifications which such a system of artificial cover should possess, and the feasibility of procuring such cover.

And, before proceeding, I feel it incumbent upon me to say a few words concerning the suggestion repeatedly made of covering infantry marching to the assault by means of smoke shells. I do not profess to be the originator of the idea. I once thought I was, but, on making a search at the Patent Office years ago, I found that I had been forestalled. Evidently, there is nothing new under the sun! I have, however, given the matter a good deal of attention, and I have failed to answer satisfactorily a few questions, such as these:—

1. Supposing the enemy's position to have a front of three miles (the Boer position at Magersfontein is said to have extended for five-and-twenty miles), how many smoke shells would have to be fired to form a curtain of smoke sufficient to screen the attacking force from the enemy's view?

2. Supposing the advance to be over a distance of two thousand yards, which might require, say, fifteen or twenty minutes to cover, what should be the size of a shell capable of producing a dense column of smoke that would last that period of time?

3. Supposing the wind rose and swept away the smoke from a flank, or, in fact, from any quarter, what would be the use of the smoke shells?

4. Supposing the assaulting columns to have reached one of a series of invisible obstacles, such as a barbed wire entanglement concealed behind the interior slope of a glacis, and placed within a short distance of the enemy's trenches, would not the noise made by the assaulting columns betray their presence, and expose them to a murderous fire at point-blank range?

These considerations have led me to conclude that some other method of artificial cover would perhaps be preferable.

When our engineers are charged with the dangerous duty of blowing up a gate, a wall, or a stockade, they are told to use every precaution, not excluded the use of a bullet-proof mantlet. Again, at sieges, when the trenches of the besiegers are being pushed forward by the method of the sap, the sapper pushes before him a sap-roller, usually a large gabion filled with fascines. May I ask why in order to attack a strongly entrenched position in front without unnecessary loss the same system should not be adopted?

At Milan, in 1848, during the famous *Cinque Giornate*, the revolted citizens defeated the Austrian regulars by a similar device.

And General Ducrot in his "Defence of Paris" says that *the only successful attack* by the French on the Prussian position at Le Bourget was made by means of *sap rollers*, or hollow cylinders filled with earth, the men lying beneath them, and *pushing them on.*

Steel mantlets and steel bulwarks are used on board men-of-war, steel shields have been devised for field guns and guns of position, and machine guns are invariably provided with defensive armour. Why, then, should not infantry advancing under fire across the open to attack a strongly entrenched position march up to close quarters under the protection of a bullet-proof mantlet?

What are the objections to such a scheme?

I know of seven principal objections that have been raised against the adoption of shields or mantlets for infantry:—

1. Our transport is already so cumbersome that it is not deemed advisable to increase it.
2. A shield would entail either extra weight on the men, already too heavily laden, or extra fatigue.
3. It would detract from the mobility of our infantry.
4. It would be difficult to get the mantlets at the required spot at the exact moment when they are wanted.
5. Once the men got behind cover, they could only be made to leave it with difficulty.
6. The extra cost.
7. Mantlets offer a large target.

There may be other objections of which I am not aware. Meanwhile I shall endeavour to reply to these.

1. As to the undesirable increase of our already too cumbersome transport, we must pay the penalty of progress. A savage covers himself at night with the skin of some animal, while civilised man requires his mattresses and pillows, his sheets and his blankets; and while a savage goes about almost naked, a European feels uncomfortable without his shirt and collar and cuffs, hat and boots, and all the accompanying paraphernalia of a townsman's toilet.

The real question is, Would mantlets be useful? If so, a certain increase in the transport cannot be undesirable. A pontoon train is cumbersome, yet what well-appointed army will be without it? A balloon

detachment is a comparatively recent addition to our train; but it was found too useful to be dispensed with. How long is it since picks and shovels began to form part of the regimental baggage? Therefore, if mantlets are necessary, or even only useful, they must be added to the list of our military impedimenta. And if they will allow of our men advancing in comparative safety to within close quarters of the enemy, their utility, nay, their necessity, seems to me to have been fully demonstrated.

If to this we add a kind of mantlet easily compressed, so as to occupy but little space on the sea journey, a mantlet easily convertible into a light cart for facility of locomotion, the question of a cumbersome addition to our transport is reduced to its minimum terms.

2. But it is said that a shield must necessarily entail either extra weight or extra fatigue on the men of the assaulting line. I beg leave to differ.

Our men are already so heavily laden with weapons, necessaries, and ammunition, and have to perform at times such long and fatiguing marches, that a shield to be carried by each man is certainly out of the question. But if the men of the firing line were to march behind a mantlet that would screen their bodies to such a height as would not prevent them from seeing what is in front of them, nor from firing at the enemy as they advance, and the propulsion of which was the task of a second line of men in rear of the first, we should have answered the second objection, as not an ounce of additional weight nor any extra fatigue would be entailed on the men of the firing line.

3. The third objection is that it would detract from the mobility of our infantry.

I cannot see the strength of this objection. I should have the men trained to march and fire in rear of the mantlet, with unexpected halts, and over difficult ground; but, I should have the mantlets to follow in the rear of the brigade, or even of the division. If a forced march were necessary, the mantlet train could be left behind, and it would follow at greater leisure.

4. And this leads me to answer two objections at once, for it is also a reply to the fourth objection, namely, that it would be difficult to get the mantlets at the required spot at the exact moment when they may be wanted.

Under the present rules, two small-arm ammunition carts follow each battalion at a distance, moving in rear of the brigade. Who will say that they cannot be got when they are wanted? For if it were so, the same argument would hold good against these two small-arm ammunition carts for each battalion, as for the mantlet train. But, I have not heard that it has been proposed to do away with the carts in question.

I have been asked, Can your mantlets go up a kopje? A mantlet should be able to go where a gun can go, where a machine gun can go, where an ammunition cart can go; nay, where none of these can go; for a mantlet can be made lighter than any of them, and much more perfectly balanced.

But supposing a mantlet could not be carried up a kopje in front of the men, what then? Is that a reason why it should not be adopted? Guns could not be taken up Spion Kop; is that a reason why guns should be declared useless? But, as a matter of fact, it is not up a kopje that a mantlet would be needed; for, once on a kopje, the men would have reached the zone of natural cover. It is down in the plain that the mantlets are needed; in the plains at the foot, or in front of the enemy's trenches. As we have already seen, the ground over which our men had to advance at Magersfontein was a "grass and bush-strewn *plain*, just missing being level by reason of a few slight ridges." At Paardeberg, both on the north and south banks "the ground was *level*, and the advance across it was deadly." At Modder River there were *no hills to climb*. A rough plan of the battle shows a maximum difference of level of barely ten feet over the whole battle-field.

Now, let us take a few practical examples, and see how a mantlet train could have been employed with advantage during some of the battles of the present campaign.

At the Modder, for instance, after Lord Methuen had arrived at the conclusion that only a front attack was possible, if a certain number of bullet-proof mantlets had been distributed to each company of the attacking force, do you think that the 3rd Grenadiers and the 2nd Coldstreams would have found it necessary to lie down under that hot fire, and remain in that unsafe and uncomfortable position until dark?

At Magersfontein, would it have been possible for the Highland Brigade to be surprised if they had been preceded by a line of bullet-proof shields? Why, the bullets would have spent themselves harmlessly against the shields, and the enemy under the threat of a bayonet charge would most probably have given way.

At Colenso, where such a deadly fire was kept up that, in General Buller's words, "no attempt could succeed to cover those fatal five hundred yards," would not a few bullet-proof mantlets have saved the guns? For we must bear in mind that during the whole of this campaign, with a few rare exceptions, what our troops have suffered most from has been *rifle* fire; and on this occasion there appears to have been little else.

At Paardeberg, again, after the enveloping attack had been completed, would not a general advance under cover of bullet-proof mantlets have put an end to an unnecessarily prolonged situation, where we ran great risk of the tables being turned against us?

But it is not only with large bodies of troops that these mantlets would be of use. In a hundred small actions their use would be simply invaluable. Let us take for instance Colonel Plumer's night attack against the Boers at Gaberones on the 12th inst., an attack that failed owing to the Boers' dogs giving the alarm. If sheltered behind their mantlets, our men could have defied the enemy's volleys, or at least retreated without loss.

With a mantlet of the simplest construction, easily taken to pieces, and as easily put together, there should be no difficulty whatever for a mantlet train of pack animals, under the charge of a special officer, to

follow the brigade or division. When wanted, the mantlets could be put together in a few minutes, and pushed to the front by the men.

5. The fifth objection on the list is that once the men get behind cover, they can only be made to leave it with difficulty.

I have seen this objection in military books, but I am of opinion that it is only a theoretical objection. My opinion would of course be of no value were it not supported by the practical evidence of the recent campaign. The objection would, I suppose, refer to natural cover in the same degree as to artificial cover; but, having carefully perused all the descriptions which I could gather of the different actions in South Africa, I have not come across one single instance of men hesitating to leave cover when the moment of the charge had arrived.

6. The sixth objection is the extra cost.

To a nation that can afford to supply her troops with two entirely different kinds of uniform, one in time of peace and the other for active service, a few thousand pounds for the effectual protection of her infantry in the field cannot be a matter of the slightest consequence. Besides, the expense would be easily made good by a reduced list of widows' pensions and compassionate allowances for the unfortunate sufferers from the war.

7. There is one more objection, and that is, that mantlets offer a large target to the enemy's fire.

That objection has been made to mantlets for guns, and I believe it has been found valid. But there is all the difference between guns and infantry. Guns are powerless while on the move. To be of any use, guns must be halted, and the less they are moved the better. These long halts afford ample opportunity to the enemy to get the precise range. Their shrapnel would be of but little use against mantlets; but, being in no hurry, they can find their range with direct hits with common shell, which might prove fatal. But infantry would be, on the contrary, continually on the move, and it would not be so easy for common shell to strike an ever-moving target.

Again, artillery must be concentrated; concentration of guns, as well as of fire, being the great general principle of artillery tactics. Infantry would advance in line all over the field.

A concentrated fire from the enemy with common shell on the mantlets of the guns would have disastrous results if the fire were accurate. The concentration of the same fire on a portion of the advancing line need not, even if the fire be accurate, stop the assaulting columns. A second line would fill up the gaps, or the troops would close inwards and restore continuity to the line.

During this campaign we have heard a great deal of deadly rifle fire, and something of shrapnel fire, but very little of common shell fire—at least on the part of the enemy—because it would be the least effective kind of fire, as the most difficult, against a moving target. The Boers have fired on Ladysmith, Mafeking, and Kimberley with percussion fuses; but the target in each of these cases was not a movable one. Therefore it is principally against rifle and shrapnel fire that we must protect our men.

But, in order not to neglect any precautions, the front of each mantlet should be reduced to such dimensions that, if struck by common shell, the loss could not be greater than if the shell were to burst in the open.

With regard to the objection as to the effect of direct hits from the enemy's artillery, I have a theory of my own, which, however, has to be borne out by experience. It may seem strange at first, but it is based on the following assumptions:—

1. That the explosion of a shell is not *instantaneous*.
2. That its remaining velocity at the point of impact is of a good many hundred feet per second.
3. That the mantlet is a perfectly balanced cylinder of light weight, carried on two wheels.
4. That this cylinder is raised from the ground by the two wheels to the height of one foot or a little over.

My theory is that, on striking the shield, the shell, whether shrapnel or common, *will go right through it*, at the same time perhaps carrying the shield along with it some little distance to the rear, knocking over the men behind it, and finally exploding in rear of the mantlet.

Now, with the exception of one or, perhaps, two men who may find themselves in the direct line of fire, and who would be struck by the shell, shield or no shield, I maintain that the rest of the men would most probably be knocked over by the forced retrograde motion of the mantlet which would pass over them, and they would find themselves at the time of the explosion lying on the ground no longer in the rear of the mantlet, but in front of it, with the mantlet as a protection between them and the bursting shell.

But, whether this be the case or not, the thickness of the steel plate is so little, and the remaining velocity of the shell would be so great, that the latter would go through the former as if through a sheet of paper, and explode at such a distance beyond the shield as to be beyond the reach of the men with the shield.[1]

Having now, to the best of my ability, endeavoured to dispose of the objections raised against the use of mantlets for infantry, I shall proceed to enumerate the qualifications which, in my humble opinion, such mantlets should possess.

As regards protection:—

1. They should afford sufficient protection to the men from rifle and shrapnel fire, whether frontal or oblique, at the shortest ranges.

2. They should present a restricted front, so as to reduce to a minimum the number of casualties in cases of direct hits with either shrapnel or common shell.

3. They should allow the men a good field of view, and a maximum field of fire, whether on the move, or on the halt.

4. They should allow of the free movement of the men, and of their easy removal from the protection of one mantlet to that of the next.

[1] One of these shields is in course of construction, and it is to be hoped that the writer's theory will soon be put to the test.

5. They should afford as efficient cover in the retreat as in the advance.

6. They should be provided with a contrivance for destroying obstacles, such as barbed wire entanglements, etc.

As regards mobility:—

1. They should be sufficiently light to be pushed or drawn along by a couple of men even over rough ground.

2. They should be convertible into light carts, in order to be drawn by horses or mules along a road or through open country in the absence of a railway.

3. They should be capable of being taken to pieces for compressed packing either on board ship, or by rail, or on pack saddles.

4. They should leave the men of the firing line unencumbered with any extra weight, or labour during the attack.

5. They should be easily directed.

Besides these qualifications, the construction of the mantlets should be of the greatest simplicity, no skilled labour being needed to put them together.

These qualifications are sufficiently numerous, but I trust I shall not be considered presumptuous for saying that I have thought of a device that will, I think, fulfil every one of these conditions.

The mantlet I have conceived, and which I have called the "Roller or Drum Mantlet," is, indeed, of the simplest construction. It is, in fact, an up-to-date improvement of the old sap roller.

It consists of three main parts:—

1. A hollow steel cylinder.
2. Two sustaining wheels connected by an axle.
3. A handle.

The cylinder has an extent of front of about six feet and a diameter of about three feet four inches.

The top of the cylinder should reach to a height of about four feet six inches from the ground, the height of an ordinary parapet. In order that it should reach this height, the two sustaining wheels, which have the same axle as the cylinder, have a diameter of about five feet eight inches. By this arrangement all the vital parts of the men's bodies, except the head, are behind cover.

Head cover can be provided by a steel plate held up by two rods fixed to the two extremities of the axle of the cylinder, and again slantingly to the two side-bars of the handle. This steel plate should be held up obliquely from front to rear, so as to cause the deflection of the bullets. Between the lower edge of this steel plate and the crest of the cylinder a space of an inch or two should be left in order to allow of a good horizontal field of view.

Below the cylinder there is an open space one foot two inches in height, to allow for stones, etc. It leaves a deficiency of cover of little amount, considering the usually superior height of the enemy's position, the inequalities of the ground, and the shape and depth of the mantlet.

The handle somewhat resembles that of a garden roller. The wheels, axle, and handle should all be hollow and composed of several pieces screwable together for convenience in packing. For the same reason the sheet of steel that forms the shell of the cylinder is divided into a number of sections fixed to the frames by means of steel screws and nuts.

All similar parts, and all the screws and nuts are interchangeable.

The whole mantlet is painted khâki colour.

Now one word regarding its use.

Employment of the Shield.

Each mantlet is calculated to give cover to half a dozen men ; three in the firing line, firing over the mantlet, and three as supports pushing the mantlet on ; the senior man being in charge. By the position of the body while pushing, the supports would be entirely under cover.

The mantlets should be employed usually in line or échelon, with an interval of a couple of paces between mantlets.

Two hundred of these mantlets, including the intervals, would cover a front of half a mile, equal to the front of a brigade.

And now, having given you an idea as to the construction and employment of my roller mantlet, I shall further tax your patience by enumerating all its known advantages and good points.

Advantages of the Shield.

First, as to protection :—

1. The shell of the cylinder, which is of the lightest steel, is calculated to be bullet and shrapnel proof at a range of one hundred yards. The circular shape of the cylinder increases its thickness more or less along the whole of the circumference, except at one point where a bullet would strike the cylinder exactly at a right angle to it. Also this same cylindrical shape of the mantlet causes it to present to the bullet two surfaces, one convex and the other concave. So that the mantlet would be practically bullet-proof *at almost any range.*

2. The convex shape of the cylinder would cause the deflection of the bullets, some of which would fly up into the air, and some bury themselves into the ground.

3. The shape and colour of the mantlet render it invisible at a distance.

4. The diameter of the cylinder—three feet four inches—affords protection to the men from oblique as well as from frontal fire, notwithstanding the intervals.

5. The restricted front of about six feet, and the intervals at the sides, are calculated to limit the number of casualties in the case of a direct hit with common shell.

6. During the attack, the cylinder can be made to revolve with the axle of the wheels, thus offering a continually varying surface to the action of the bullets.

7. Surprises would be impossible, as the enemy's bullets would spend themselves harmlessly against the bullet-proof shell.

8. On the halt, the mantlet allows of two tiers of fire, one above the cylinder, the other below at one foot two inches from the ground.

9. The space below the cylinder can be utilised to cut wire entanglements without the men leaving their cover.

10. In case of a check, the mantlet affords as good cover during a retreat as during the advance. The men would draw the mantlet instead of pushing it.

11. The enemy would find it impossible to pick out the officers.

12. The men would advance with greater security, fire with better aim, and on reaching close quarters can advance to the charge between the intervals.

13. A line of mantlets would constitute a very formidable laager, which could be strengthened within by means of trenches with sortie steps.

Now as regards mobility and portability:—

1. As all the parts can be taken to pieces, and no piece is greater than three feet by two feet, each mantlet can be packed in a case three feet by two feet by one foot.

Two hundred mantlets would measure but one thousand two hundred cubic feet, or, in other words, would go into a room twelve feet long by ten feet wide by ten feet high. Three railway trucks would be sufficient to carry the whole lot.

2. Should there be no railway near, each mantlet can be converted into a light provision or ammunition cart; the handle having three holes for various purposes, one of which is to fix shafts or traces for a mule or horse. One mule or horse could draw two such carts, one behind the other.

While used as carts, the cylinder can be made not to revolve with the axis.

3. Should it be desired to take the mantlets across hilly country without roads, they can be taken to pieces, and packed on pack saddles.

4. It is difficult to speak with any degree of accuracy concerning the exact weight of steel plates with which experiments are continually being carried on with a view to obtaining the least weight capable of resisting projectiles. But it is calculated that the weight of a mantlet as proposed should not exceed at the most four hundredweight, a weight which, perfectly balanced as it would be on two wheels of large diameter, could be easily pushed forward by a couple of men for a reasonable distance. As a matter of fact, three men would be available, and in case of emergency six men could push it along.

5. The large diameter of the wheels would enable the mantlet to cross small ditches, etc.

6. As the men forming the supports would push the mantlets forward, the men constituting the firing line would not be encumbered with one ounce of extra weight, nor saddled with the fatigue of pushing the mantlet.

7. If the wheels were shot away, or in any way disabled, the mantlet being cylindrical could, in a case of emergency, be still pushed along without too much difficulty.

To the above may be added several other advantages, such as the following :—

1. One of the greatest points in these mantlets is their extreme simplicity of construction.

2. All similar parts, and all screws and nuts being interchangeable, they can be put easily together by unskilled labour, such as private soldiers.

3. By passing rods or poles through the holes in the handle, and thence into the ground, the mantlet can be fixed or picketed. A blanket stretched over the handle will afford cover from the rain on the halt.

4. By taking off two or more sections of the steel sheet, the mantlet at the end of a fight can be converted into an ambulance for one wounded man. A simple contrivance introduced within the cylinder forms a comfortable hammock free from jolting; and if head cover is provided, the steel plate can be brought down to the level of the handle, and form a seat for two or three men.

5. Finally, during the attack, a box of reserve ammunition can be strapped to the handle, and kept under safe cover.

Conclusion.

And now, apologising to you for having so severely taxed your patience, and offering you my best thanks for the benevolent attention with which you have so kindly listened to me, I shall bring my long dissertation to an end by recapitulating in a few words my principal arguments in favour of the adoption of bullet-proof mantlets for infantry in the field.

With a mobile, active enemy in front of you, extended behind successive tiers of trenches along a front of ten or twenty miles, it would be impossible, without an overwhelming superiority in numbers, to attempt a flank attack without laying yourself open to a counter-attack on your own flank.

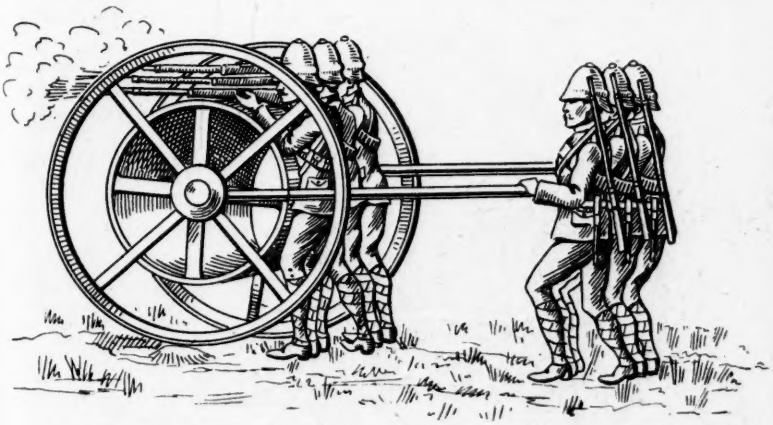
But even given overwhelming numbers, a flanking movement will eventually turn into a front attack in some part or other of the field.

There the enemy, having chosen his own position, will have provided for a good field of fire ; all the ranges will have been measured and marked out, obstacles created, all cover swept away. To win a battle it will be almost always necessary to bring the men up to the enemy's position. That fatal zone of fire must be crossed ; and if the enemy is determined, well armed, and well entrenched, ten times their number of men will not be sufficient to storm the position. To face that deadly storm of lead without useless slaughter, it will be utterly *indispensable* to use some kind of artificial cover.

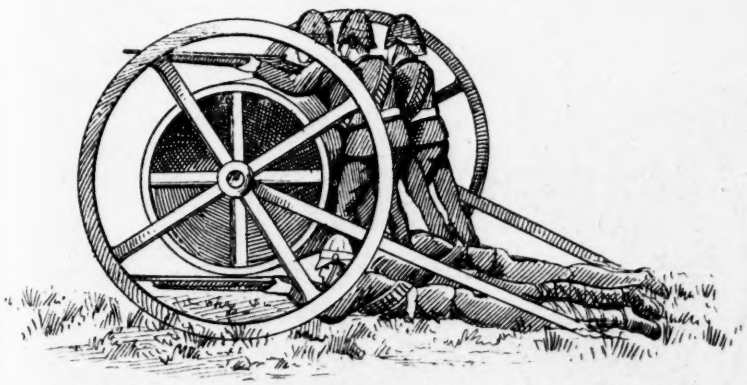
I will not dare to say that the cover I have suggested is the best. Let the best be adopted, and without loss of time ; for when so simple a

contrivance could save thousands of precious lives, it were a national crime to neglect its use. For my part, I shall have the satisfaction of feeling that I have had the good fortune of being afforded an opportunity of contributing, in however insignificant a degree, towards the solving of so momentous a problem as the avoidance of wasteful sacrifice of life, and the securing of victory by the front attack.

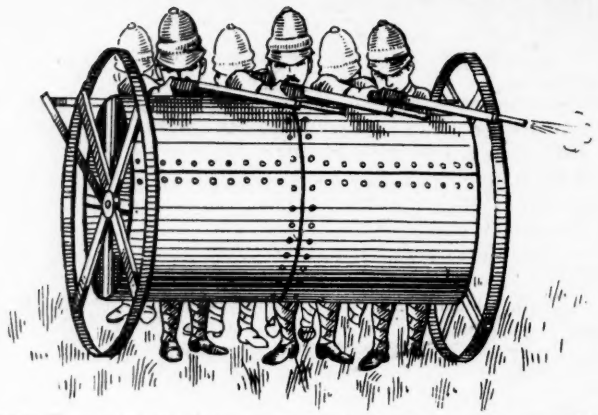
One of our most eminent statesmen (Lord Rosebery) said the other day that we are not an economic people, that we are wasteful, and do not conduct war on scientific principles. There seems to be some truth in his remark. If so, let us quickly turn over a new leaf, lest British valour, unaccompanied by science, be found no longer sufficient to win a campaign.



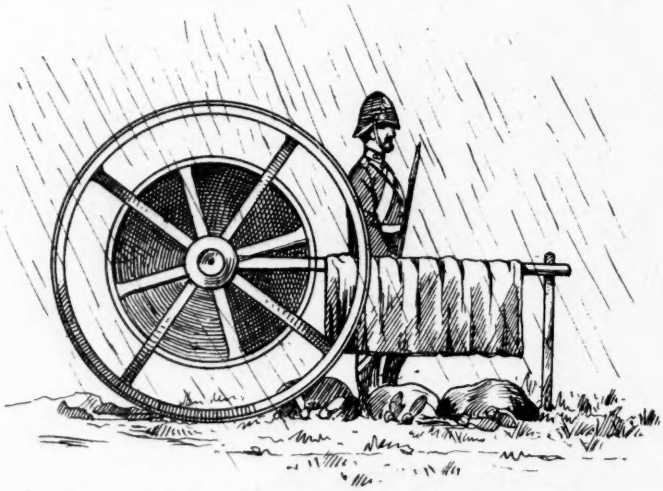
1.—Side Elevation of Mantlet, without Head Cover, on the March.



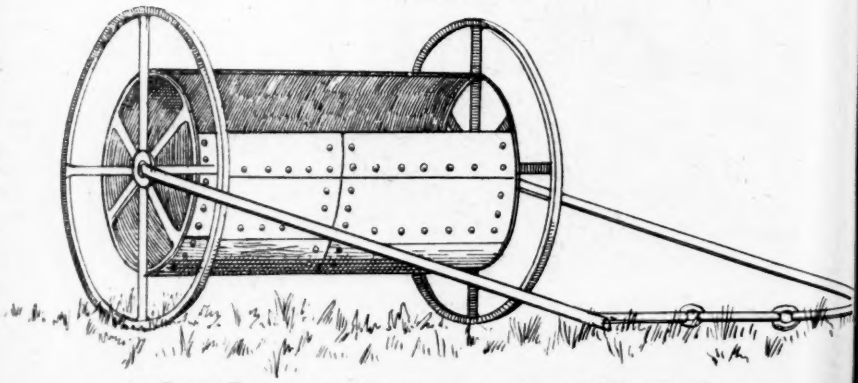
2.—Side Elevation of Mantlet, without Head Cover, on the Halt; Two Tiers of Fire.



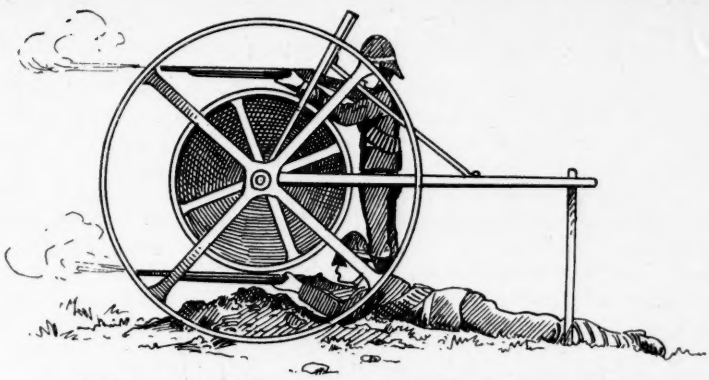
3.—Front Elevation of Mantlet in the Advance, as seen by the Enemy.



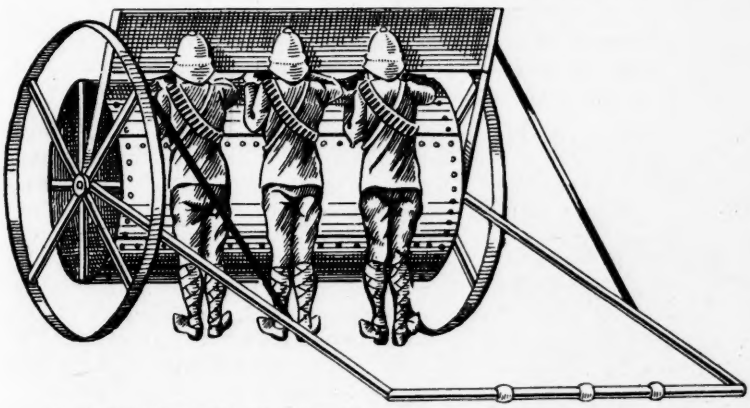
4.—Profile of Mantlet, without Head Cover, on the Halt on Bivouac.



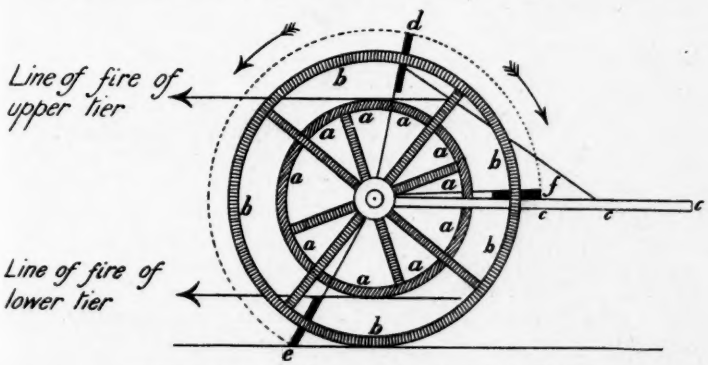
5.—Front Elevation of Mantlet turned into a Provision Cart.



6.—Profile of Mantlet, with Head Cover, on the Halt.



7.—Rear Elevation of Mantlet, with Head Cover, on the Halt.



8.—Profile of Mantlet, showing various Applications of Head Cover Shield.

a = Cylinder. *b* = Carrying Wheels. *c* = Handle.
d = Steel Sheet as Head Cover. *e* = Steel Sheet lowered as Cover for Men lying down. *f* = Steel Sheet lowered to serve as a seat.

AN ITALIAN VIEW OF THE BOER WAR.

By General Count LUCHINO DAL VERME.

Published in the "Nuova Antologia," June, 1900.

Translated by Colonel C. NEEDHAM, Military Attaché to the Embassy at Rome.

(*Continued from July* JOURNAL, *p. 791.*)

PART III.

ON 16th March, Lord Roberts entered the capital of the Orange State, at the head of the Cavalry Division. The manner of his arrival has been briefly sketched in a previous article, so far as could be gathered from the short accounts given by English telegrams, which, twenty-four hours after events had taken place, spread the news through two hemispheres.

Before proceeding further, it will be well to re-examine the reports made by the English war correspondents, and the comments of the military critics, not omitting to mention what was said of these events in Pretoria. It is impossible to thoroughly understand what has happened during a war, without comparing the accounts given by both sides.

By 10th February all preparations were made, the army intended for the invasion of the Free State was ready, and echelonned along the railway between the Orange and Modder Rivers. There were three infantry divisions under Generals Kelly-Kenny, Tucker, and Colvile, and a cavalry division under General French. There were 23,000 infantry, 11,000 horsemen, 98 guns, and 700 wagons drawn by 9,000 mules and oxen; in all, a little under 40,000 men. This imposing body of European troops, the like of which had never been seen in Africa, was massed at Ramdam, a little watering-place four miles east of the Orange frontier, and twenty-two miles from Modder River. General French arrived there with three cavalry brigades, six field and seven horse batteries, one howitzer battery, the naval contingent, and the 7th Division under General Tucker, all from the camp at Enslin, which had been pitched north of Graspan Station, where Lord Methuen had fought his second battle in November. The 6th Division, accompanied by Lord Kitchener, Chief of the Staff, had started from another camp more to the south. The two mounted infantry brigades, which had also arrived at Ramdam, came from Orange River. General French marched without delay towards the Riet, across the desert plains of Waterval, and, on the 12th, reached the De Kiel ford, where the

enemy were located; but the Boers were deceived by a bold manœuvre on the part of the general, who made a feint on the ford where they were ready to dispute the passage, while he sent a brigade at full gallop further down stream, where there was no one to oppose him. He crossed and held the ford until the arrival of the 7th Division, which marched in late at night, completely exhausted. Continuing his march northward, he reached the Riet, a tributary of the Modder, the evening of the 13th. Here he was compelled to halt, for the horses were stumbling from exhaustion, and the baggage had not come up. The heat had been oppressive, there had been no opportunity for watering the horses, and no less than 100 died on that day alone.

On the 14th the cavalry was divided into two detachments to occupy the Klip Drift and Klip Kraal fords. The following day they crossed over and captured three laagers on the north bank of the river. From that moment the enemy's line of communication with Bloemfontein was cut. The British forces again united, and as soon as the 6th Division came up, the whole body of cavalry moved towards Kimberley on the 16th—twenty-five miles of march, without water.

There were twelve cavalry regiments of three squadrons each, two mounted infantry brigades and ten batteries, crossing the bare plains of Alexanderfontein, deployed as if on parade; thirty-six squadrons and sixty guns spread over the flat country which extends for several miles south of the Diamond City. The advance guard was formed by the Scots Greys, a magnificent regiment, which once seen at Aldershot, in their brilliant scarlet uniforms, with bearskin busbies, and mounted on their splendid grey horses, will never be forgotten. This host of men, horses, and guns, was suddenly compelled to halt by heavy fire from the kopjes surrounding the plain of Alexanderfontein. The artillery and rifles were at long range, but it must be confessed they harassed the march considerably, for parties had to be sent out to drive them off. The heights being cleared of the enemy, the march was resumed, but was again delayed by a barbed wire entanglement; this obstacle was soon passed, but the delay was sufficient to enable the Boers to carry off their guns, with which they disappeared from view. At last Kimberley was in sight. The excitement was intense. For several hours heliograph messages passed between the besieged and the relieving force, the latter being anxious to obtain a knowledge of the situation and of the best way to advance. The answer came they were on the right road, and General French entered the town as the besiegers, who held the northern positions, and did not know what was going on to the south, fired their last rounds.

The lucky general had left Enslin[1] camp the evening of February 10th, and relieved Kimberley the afternoon of the 15th. He had marched 150 miles in less than six days at an average rate of 25 miles a day; but it had cost him dear, for of the 5,000 horses that started from Enslin he left on the road 1,474, foundered, exhausted, or sick. The baggage-train had been left behind on the second day's march, and had not been

[1] The author is of opinion that these distances are considerably exaggerated. —TRANSLATOR.

seen again; but there was no lack of provisions, for orders had been given that every man on horseback—and all were mounted—should carry five rations of food and forage for as many days as it was calculated the rapid march would last, through a country without any local resources. The rate of march was necessary, not only to surprise the enemy, turn the position at Magersfontein, and so cut his communications with the capital, and to relieve Kimberley, but also to shorten the time during which the force would be distant from the re-victualling base, and crossing a country without water, of which great quantities would be required to supply so many horses.

While the skilful leader was thus accomplishing the task set him, and General Tucker, with the 7th Division, occupied Jacobsdal, the main body, consisting of the 6th and 9th Divisions and the greater part of the mounted infantry, under Lord Kitchener, arrived on the morning of the 13th at Waterval Drift on the Riet, a ford some five miles above De Kiel, where the others had crossed. Here a serious disaster happened. A convoy of 180 wagons, which had left Ramdam, without an escort, and reached the ford on the evening of the 14th, commenced the passage of the river the next morning under considerable difficulties, when suddenly a heavy rifle fire was opened on the ox-teams, and disclosed the enemy posted on the neighbouring hills. They may have numbered three or four hundred, and the detachment of 250 men left to guard the ford was ordered to attack them. The attack was unsuccessful. At mid-day reinforcements arrived, but they were insufficient, for the Boers had also been reinforced. By evening a whole brigade of English appeared, having retraced their steps, but even then the enemy could not be dislodged, and as it was most important to advance the whole force without delay, Lord Kitchener gave orders to sacrifice the convoy. The 180 wagons were abandoned, the troops resumed their march to the north, and the Boers took possession of the booty. This was a serious loss, and was not compensated by the capture of 78 wagons belonging to Cronje's convoy, on the following day, at Drieput ford. It was a loss of which the troops felt the effects during the whole of the march to Bloemfontein, and had not a very liberal allowance of provisions been made, the disaster might have had very serious consequences. The great Captain of the modern age fully understood the summary importance of guarding convoys when he dictated at St. Helena the "*Projet d'une nouvelle organisation de l'Armée*"; in this he laid down the minimum strength of an escort in infantry, cavalry, and even artillery, in proportion to the number of wagons, and concluded by saying, "Generals and other officers who allow convoys to march without the prescribed escort, will be held responsible for the consequences."

Having made up for lost time by forced marches, the main body of Lord Kitchener's troops arrived at Modder River the evening of the 15th. At dawn on the 16th clouds of dust to the east betrayed the presence of an enemy's convoy. It was that of the Boer commandant, who, seeing his attempt to delay the advance of French's cavalry had failed, sent orders to Magersfontein to start all the wagons eastward. The

morning of the 16th the enemy's camp was abandoned, the convoy having filed out during the night after the Boers, who had thus escaped the flanking movement. Lord Kitchener ordered Knox's brigade to attack the rear of the convoy, and the mounted infantry to overtake and attack the centre, so as to effect its capture.

The convoy had, meanwhile, laagered at Drieput, near the Kimberley road, north of the river, and there a fight commenced, which lasted at intervals till evening, when the enemy were not dislodged. They left during the night, abandoning the convoy. This engagement of 16th February is designated as Klip Kraal in the official report of English losses, which amounted to 3 officers and 77 men wounded.

Having escaped pursuit, Cronje directed his march on the 17th towards Paardeberg. On his arrival he found General French had left Kimberley and overtaken him. A final effort had been required of the exhausted British cavalry. They had been incessantly employed during the day following the relief of Kimberley, and just when they were counting on a day's rest, they received orders at 11 p.m. to start in pursuit of Cronje, who must be overtaken at any cost. With some difficulty 1,200 horses, "able to move," were collected, and at five in the morning they started. By mid-day they had come up with Cronje. He had halted at Wolves Kraal ford, intending to cross it on the 18th; but during the night he ascertained the mounted infantry were south of Paardeberg, and determined to make a stand there to save his baggage. He never supposed that Lord Roberts could have turned his flank at Magersfontein. Those who entreated him to leave received the answer, "Let the English come on!" He imagined they would come by the same road, and make the same mistakes that Lord Methuen made in December. This statement was made by Count Stornberg, an Austrian officer, who was taken prisoner with the Boer general. So, later on, he could never bring himself to believe that the English infantry had almost overtaken him. He imagined he had only to deal with mounted troops, and counted on getting out of his difficulties before the main body could come up. He now prepared his position for defence, astride of the river.

At dawn on the 18th the mounted infantry opened fire, in order to give the 6th Division time to come up. When the latter arrived, Lord Kitchener found he was only fighting a rear guard, and that the enemy's position was further up-stream. He ordered the regiments to march on until they had passed the place where Cronje's camp was pitched. This was a happy thought, for once the outlet closed, the enemy must surrender. Having made sure the only way of escape was blocked, Lord Kitchener brought three batteries (two field and one howitzer) into action, and they did considerable damage to the laager. At nine a brigade crossed the ford, closed in, and opened fire. At eleven French's horse artillery arrived, and came into action north of the river, where they were joined by the mounted infantry. At 3 p.m. reinforcements were sent up by Colvile, who was hurrying on with the 9th Division, but at nightfall the Boers were still masters of the situation. Fighting had been going on from dawn till dark, and the two English divisions

engaged had 1,108 men out of action. Many had fallen out of the ranks to quench their thirst at the river under a murderous fire.

Each side claimed the victory, which, as a matter of fact, was gained by neither. Some of the English war correspondents maintain that Lord Kitchener need not have sacrificed so many lives, and might have reduced the laager by a simple blockade.

On the 19th the Commander-in-Chief arrived with the 7th Division, in time to decide on the answer to Cronje's appeal for an armistice to bury the dead, an appeal which was met with a flat refusal, the idea being that the armistice was only requested on the chance of reinforcements appearing. Some commandoes were already showing on the scene of action. They came from the country south of the Orange River, and were the same Boers who, on the afternoon of the 18th, had surprised a party of Volunteers from Kitchener's Horse while they were watering their horses at Osfontein Farm, and made 30 of them prisoners, with 4 officers.

As the attempt to take the laager by assault had failed, the Field-Marshal, who did not wish to sacrifice any more lives unnecessarily, gave orders for trenches to be dug, and for the bombardment to begin. The Boer general's position astride of the Modder was in the shape of an oval, of which the longer axis extended about two miles along the river, and the shorter about one and a quarter miles across the banks; these banks were from 24 to 30 feet high, very steep and broken by ravines and clefts, which afforded capital shelter to the fighting men, and to the women and children, partly from their natural conformation, and partly from excavations cleverly made in the clay. The crests of both banks were entirely covered with trenches. More important works had been constructed up-stream, to front the main body of the English troops, and still further north, on hills where three Krupp guns had been posted. The wagons were packed in the centre, under the north bank and close to the ford, while further north headquarters were established in a hut intended to shelter passengers.

Work at the trenches progressed quickly, so that in forty-eight hours the English were within a few hundred yards of the enemy's defences.

On the 20th the bombardment was redoubled and did serious damage to the wagons full of provisions, baggage, and ammunition, which were massed in great numbers and offered a splendid target, so that they soon took fire. The bombardment continued at intervals during the 21st, 22nd, and 23rd, when a Boer corps from Ladysmith suddenly attacked the line held by the Yorkshire Regiment, who beat off the assailants and made 87 prisoners.

Another misfortune was added to the burning of the wagons; many of the horses and oxen, which could not, like the men, find refuge in the trenches, were killed, and the stench of their carcases poisoned the air. By good luck for the Boers, the river rose on the 25th, and the dead bodies were carried by the stream past the English camp. The soldiers amused themselves counting them, and found there were no less than 1,200.

On the 26th, another appeal for an armistice came to the Commander-in-Chief, and was again refused. However, the bombardment was stopped, and was not resumed until after the Boers had made a desperate assault on three different places simultaneously. It was their final effort.

Great pressure was put upon the Boer leader to surrender, but Cronje would not hear of it, remembering that the next day (the 27th) was the anniversary of Majuba Hill. But pressure was also brought to bear on Lord Roberts by the officers of his staff, who entreated him not to miss the opportunity of avenging the defeat. Whatever the orders given, it so happened that on the morning of that memorable day, while it was still dusk, three companies of Canadians, who held the trenches above the laager on the north bank, approached, with 50 men of the Engineers, to within 100 yards of the enemy's trenches. While the Boers received them with a desultory fire, the engineers, immediately behind the fighting line, dug a shelter-trench along the river bank, and behind this the Canadians took up their position, and waited for daylight. But when the dawn of Majuba day broke, Cronje, seeing the situation was desperate, and urged by his companions, who were beginning to desert, while the English were within pistol-shot, sent a messenger to offer surrender.

We have already seen the consequences of Cronje's defeat, in the vast theatre of war, in Cape Colony and Natal.

The disasters of November, December, and January were forgotten, the prestige of the British arms was once more raised, depressed as it had been in the first period of the campaign. The enemy, especially the Orangemen, whose country had been invaded, were deeply impressed by the serious disaster which deprived them of the illusion that they were invincible. The Field-Marshal continued his advance, for he wished to take advantage of the feelings prevailing in the two opposing parties, and he was in a hurry to reach the railway, and ensure his army being re-victualled. The country traversed, which the correspondents call by a name half English, half Dutch, the rolling veldt, and which we should describe as an undulating, uncultivated plain, had no positions suitable for defensive purposes. Nevertheless, the divisions which marched on 7th March found the enemy holding a line astride of the Modder, near Anselsdal, north of Poplar Grove, about fifteen miles from Cronje's camp. It appears they were all Orangemen, who, seeing themselves threatened by a flanking movement from French's cavalry on their left, retired rapidly before the movement could be completed; hence they suffered hardly any loss. The English cavalry lost 2 officers killed and 3 wounded, and 46 men wounded, of whom 2 mortally.

On the 10th the corps continued its march in three columns. The cavalry scouting to the front found themselves unexpectedly opposed by the enemy in force, with artillery posted on a flat-topped hill surrounded by a series of small kopjes in a semicircle. This being reported to General Kelly-Kenny, he inclined his column to the left, and reached the scene of action soon after 1 p.m. Having decided on an immediate attack, he advanced the whole division in two columns; but the enemy's position was so well chosen that the leading troops were enfiladed by

rifle fire from the wings, and at the same time suffered from artillery in the centre. Perhaps the formation of the troops was not all that could be desired in these days of long range and accurate fire. Certainly the action of the cavalry was not efficacious.

Consequently, though the English managed to dislodge the enemy, they suffered severe loss and were not rewarded by complete success, the cavalry had not gone sufficiently far ahead, or so rapidly as to cut off the retreat of the enemy, who were able to escape. It is said the English horses were so exhausted by severe work, they were incapable of the exertion required of them. At 4 p.m. the Guards and the 9th Division came up, but the fight was over.

Such was the battle of Driefontein, undoubtedly a success for the British arms, but not a victory, for if the Boers abandoned their position, they were in no wise defeated. In proof of this they only acknowledged to the loss of 7 killed and 18 wounded; the English, however, declared they buried 102 dead Boers. They were men from the Transvaal, who had marched from Colesberg in Cape Colony; they were practically fighting only the 6th Division, which lost 5 officers killed and 12 wounded, and rather under 400 men in killed and wounded.

The day after the battle, the English advanced another 15 miles. The enemy were in sight, but far away on the left, and gave no trouble.

On the 12th, another long march was made to Venters Vlei. The great march was finished, for Bloemfontein was in sight, and it was known General French had occupied a position commanding the town, had destroyed the railway and captured some engines and trucks. The occupation of the Orange capital would be a mere matter of form. The afternoon of the 13th, Lord Roberts entered Bloemfontein at the head of his staff, followed by French's squadrons and the horse artillery. The Landrost and Council had come to meet him five miles outside the city and surrendered the keys. The sounds of rejoicing over Cronje's defeat and the relief of Ladysmith were still echoing through the remotest parts of the British Empire, when the telegraph brought more good news—the occupation of the Orange capital without resistance—the rejoicings were resumed, and if they did not rise to the pitch of delirium produced by news of the restored prestige of the British arms through the defeat of their formidable enemy, and the relief of the besieged towns, they were the sincere expression of the joy felt by a whole nation, to whom it seemed that the entry of their victorious troops into the capital of one of the rebel states put an end to the long period of grief and disaster. Having established himself at Bloemfontein, Lord Roberts had to think not only of resting his two divisions and preparing them for the march on Pretoria, but also of re-organising the country south of the Modder, which had fallen under his jurisdiction by force of arms, and at the same time of re-establishing order in the British district, where a decidedly rebellious feeling had been displayed. He sent Lord Kitchener to the west of Griqualand for this purpose, and having issued a proclamation to the new subjects in the Orange State, he distributed his troops in such a manner as he considered indispensable to secure freedom of action in any

forward movement, and perfect safety for his lines of communication. Perhaps he was too intent on carrying out the political idea, perhaps deceived by isolated cases of submission, he was convinced that the occupation of the capital had so discouraged the Orangemen that they would give up the struggle and leave the men of the Transvaal to defend their own country; be this as it may, it appears he did not take sufficient precautions, or at any rate that his subordinates did not make such military dispositions as would prevent the Boer commanders, still on the Orange River, from joining the main body of their army, and escaping in safety.

Commandant Olivier, who for some unknown reason had remained so long on British territory, was encamped on 10th March, eleven days after Cronje's surrender, at Albert Junction, a station north of Burghersdorp, where the general had arrived two days previously. Brabant, with the Colonial division, was on the right, towards Aliwal North; Clements, on the left, was heading towards Norval's Pont. All were advancing slowly, delayed by rear-guard actions of little importance, but which the correspondents described as battles, especially when General Brabant's local forces were engaged.

It is worth mentioning that the Colonial division formed by Lord Roberts in the beginning of February, in deference to a generally expressed wish, but not without considerable opposition in the higher ranks of the Army, was composed of various mounted corps, some of old standing, but for the most part newly raised. They were almost all Volunteers, and were designated by the names of Brabant's Horse, Frontier, Queenstown, Kaffrarian, Cape Rifles, etc.; in all about 2,800 mounted men, with twelve guns, under the command of Brigadier-General Brabant. Great things were expected of this corps, which represented the best elements of the colony—strong, active, young men accustomed to the climate, who knew the country and the habits of the burghers. They had not yet had an opportunity of distinguishing themselves more than the regular troops fighting in the colonial districts, when they were summoned to act in the enemy's country.

On 12th March, General Gatacre having reached the railway bridge at Bethulie, discovered the Boers on the northern bank of the Orange River. They had tried to destroy the bridge, but had done it little damage. Three days passed before the English were able to cross the river by the road-bridge, which was still intact, and occupy Bethulie. On the same day, the 15th, General Clements crossed the Orange at Norval by a pontoon bridge built by the Engineers, for the regular bridge had been destroyed. It was also on the 15th that Lord Roberts sent 2,000 men, two guns, and a detachment of mounted infantry, under Colonel Pole-Carew, by train from Bloemfontein, to join hands with the generals from the south. On the 16th the junction was completed.

While these operations were proceeding on the railway, Commandant Olivier was making his way to the north-east by the high-roads. Though he was obliged to move slowly from the enormous number of wagons containing not only his ammunition and stores, but all the booty

collected during five months' stay in British territory, he marched so indefatigably that, on the 18th, he left Rouxville without having been molested by Gatacre's regulars, or Brabant's Volunteers, who had crossed the Orange later at Aliwal North. General Brabant's corps of 2,000 horsemen and six guns left Dordrecht on 7th March, leaving a garrison there, and arrived at Aliwal North on the morning of the 11th. Thus he had taken four days to cover fifty-six miles, being delayed at first by the slow pace of the transport, and later on by the resistance of the enemy, who, as usual, covered their retirement by a rear-guard engagement lasting two days, the 11th and 12th. The losses were slight. The rear guard disappeared during the night of the 12th, but the main body had gone two days before. Olivier was never caught again. Fortune continued to smile on the Boer leader; for, having escaped from the English, with whom he had been in touch for so many months in their own territory, and who now let him move off unhindered with his immense baggage train, he was able to frustrate an attempt Lord Roberts made to cut him off by sending a cavalry brigade from Bloemfontein to the east. When the squadrons arrived at Thaba 'Nchu on the 22nd, Olivier was already in a place of safety. His convoy, estimated, perhaps wrongly, at 800 wagons, had been seen to cross the Jammersberg ford over the Caledon, near Wepener, on the 20th. From there he went to Ladybrand by forced marches, if such an expression can be applied to ox-teams drawing wagons; thence to Clocolan, where he halted two days and nights (probably the 26th and 27th), his cattle being exhausted. He had marched for ten days across the Orange State, with hundreds of wagons dragged by oxen, through a country occupied by the British, without ever being attacked. He succeeded in increasing his forces by the adhesion of Orangemen, who preferred following him to submitting to their new masters. It is impossible to say how many men he had with him. Probably he did not know himself, for the numbers increased daily, but they may have amounted to 5,000 or 6,000, with fifteen guns, by the time he had completed his arduous march.

General Brabant and his colonial cavalry had only once been near overtaking the enemy, having reached Rouxville two hours after Olivier had left. They were obliged to return empty-handed to Aliwal North, south of the Orange, which they had crossed three weeks before full of hopes of success.

Besides Gatacre and Brabant, General Clements also came north from Cape Colony. His troops, formed in a flying column, had, as we have seen, crossed the Orange at Norval's Pont and reached Jagersfontein on the 27th, but there were no traces of the enemy. He then went on to Fauresmith to lend a hand in bringing the country into subjection.

Things were quiet in Natal after the relief of Ladysmith. The Boers had retired to the Biggarsberg, the mountain chain which crosses the upper Natal from the great range of the Drakensberg, and bars the way to the Transvaal by the Majuba road, that road on which the English met with three reverses in 1881. At the pass crossed by the high road, and at the narrow part of the valley through which run the river Waschbank

and the railway, the Boers had posted the same guns with which they had besieged Ladysmith for four months. They had dug trenches and prepared for an obstinate defence of the pass. Nor did they neglect to garrison Van Reenen's pass between Natal and Harrismith, in the north-west of the Orange State.

It was said that while the Orangemen were returning to their homes by this pass, the people of the Transvaal seemed inclined to abandon the Biggarsberg, and retire to their old positions at Laing's Nek and Majuba; but in the middle of April, when hostilities were resumed in Natal for the first time since 28th February, they still held these positions.

Botha, who, after the death of General Joubert, had assumed command, was no longer in this district. Sir R. Buller had at his disposal four infantry divisions and one of cavalry, a great army corps of 40,000 men, fit to take part in any operations, even in an European war. Yet this great army corps had done nothing all March, and it was not until 10th April that hostilities were resumed in this almost forgotten scene of action in the east. The *Times* correspondent, writing from Ladysmith on 22nd March, after excusing Buller's inaction by the necessity of repairing the bridges which had been destroyed (though, as a matter of fact, they had been repaired by 9th March), says that many of White's men were ill from too abundant food after their long fast, and adds that Buller's troops were not in good health, as they received extra rations and did no work.

Little progress had been made by the troops in the west, but, at least, they had persevered in doing all that was possible. Lord Methuen had compelled the Boers to cross the Vaal at Warrenton, a little English town thirty miles north of Kimberley, which had been re-occupied on 16th March. But he was obliged to be satisfied with having accomplished so much, for the Boers had entrenched themselves strongly at Fourteen Streams on the north bank of the Vaal, which the English vainly tried to take on several occasions, so that they might march to the relief of Mafeking in co-operation with Colonel Plumer. This officer, with his Rhodesian troops, was manœuvring to bring help to the brave commandant of the town, which had been besieged since October. Colonel Plumer had fought many engagements with varying success in the country north of Mafeking, and there had been a few minor actions at Warrenton bridge on the Vaal, but none of sufficient importance to influence the progress of the campaign. All were more or less interested in the relief of Mafeking, which appeared every day more problematical. The last of Plumer's actions was fought on 31st March. He had 207 horsemen at Ramathlabama, and the result was a serious disaster, for he was obliged to retreat, leaving 3 wounded officers in the hands of the enemy, and losing 30 men and 74 horses.

Meanwhile the Boers continued to bombard Mafeking, and the English to maintain the defence. This had been going on for six months, and it must be confessed both sides were tired out, if they eventually agreed that Sunday should be a day of rest, during which the outposts—deadly enemies before and after the truce—met and discussed their

adventures. On one of these Sundays the besieged held a show, which they called the "Siege Exhibition," and which was a great success. Stamps, which will be the delight of collectors, were printed during the blockade, with the mark "Siege of Mafeking." Reading all this in correspondence from the town, one would be almost inclined to believe that life was easier there than telegrams from the Cape led the public to suppose. They all describe the situation as desperate. One thing is certain: that by the end of March the English had succeeded in driving the besiegers out of their advanced works, so that the murderous hail of rifle-bullets no longer reached the town, which was only struck by shells from heavy guns. Nor can the damage done by the latter be very serious, if we are to believe in letters which state that in sixty-four days the 100-pounder Creusot gun had fired 1,300 shells, which only disabled five persons. Thoughts of the fate awaiting the brave defenders of Mafeking if not relieved must have induced the English Government to embark on a serious undertaking, which is at the same time a somewhat risky diplomatic move—that is to land a body of troops at Beira on the Mozambique Canal, which will proceed by the Portuguese railway across Rhodesia to the north of the Transvaal, and, according to circumstances, break into the enemy's country from that side, or, if there is yet time, send help to Mafeking by the Buluwayo railway. A glance at the map of South Africa will show the enormous difficulties of this scheme, which, if it has some theoretical value as a strategic movement threatening the enemy's rear, does not practically assist in the invasion of the Transvaal, both on account of the great distances which cause trouble in provisioning troops, and of the isolated position in which the corps would find itself after passing the boundary, in that vast inhospitable region belonging to the enemy. Another idea may have been latent in the conception of the scheme, the only one of practicable value, and that is to prevent the immigration in mass to the uninhabited part of Rhodesia by the Dutch population, who might be driven by the success of the British arms to repeat for the fourth time the great "trek" which has taken place in three centuries, from the Cape to Natal, from Natal to the Orange, and from the Orange to the Transvaal, as they were driven further and further away by their persevering rivals the English.

Whatever may be the object of the expedition it is impossible to calculate its various phases, or to foretell when it will have accomplished its purpose. We can only quote the distances and the method of transit employed by ordinary travellers, which will certainly not suffice for a corps of 5,000 horsemen, with five batteries and all the accessories of engineers and artillery, ambulance, and supply. Let us say the troops will be carried on the Portuguese railway from Beira to Umtali, 205 miles. This tract was completed in 1898 with a two feet gauge, but has nearly all been relaid with the usual gauge of South African railways—about three feet. From Umtali they will continue their journey by the English railway to Salisbury, the new capital of Rhodesia—another 175 miles. From Salisbury, where the railway ends, the shortest way to Mafeking would be by Buluwayo, the terminus of the Cape railway, covering 280 miles by march, along a bad

road which takes five days at least by horse or carriage. But it is needless to say that by the time Sir F. Carrington could reach Buluwayo with his troops the fate of Mafeking would be decided. The expedition must therefore be considered as intended for operations on the northern frontier of the Transvaal, and to reach that frontier Carrington's men must march 340 miles over a desert and mountainous country, in all 720 miles, of which 380 by rail. It must be remembered there is very little rolling stock, or trucks for carrying horses. The first detachments of the expedition began to embark on 6th April.

Such was the situation at the beginning of April at those distant scenes of action in the east, west, and north, while the Commander-in-Chief was preparing his army at Bloemfontein, collecting provisions and ammunition, and reducing the population of the conquered districts to subjection to the new rule. All this was indispensable before he could continue his victorious march northwards. While intending to start as soon as possible, he saw that he must not delay in driving the enemy from a position they had taken up astride of the railway, either because he considered they were too near his headquarters, or because it would please the general public, and still more so his men, if some kind of forward movement were commenced.

The Boers concentrated at Kroonstadt, which was now the seat of government, had an advanced post held by a strong commando at Karee Siding, and to the attack of this position Lord Roberts, on 30th March, sent the 7th Division, two cavalry brigades, and a regiment of mounted infantry, in all 10,000 men with 36 guns, under General Colvile. The Field-Marshal had no scruples in detaching so large a force for an undertaking of no great importance, for General Gatacre's troops had arrived at Bloemfontein by the end of March, Clements was south of Fauresmith, and during the month about 30,000 men had landed at the Cape.

While General French tried to outflank the position so as to cut off the retreat of the enemy (between 2,000 and 3,000 men with artillery), Chermside's brigade, supported by another, came into action soon after mid-day. The fighting, which was at first unfavourable to the English, lasted more than two hours, but at the very moment French's cavalry seemed about to gain the advantage of the flanking movement, the Boers abandoned the heights, which were occupied by the two brigades without further opposition. The losses were somewhat heavy, 20 killed and 170 wounded.

This engagement, like those at Driefontein, at Belmont, and at Graspan, was a success without being a victory, for the Boers, faithful to their tactics, no sooner found the enemy were getting the best of the situation than they retired, without giving the victors any advantage. A serious disaster followed. Colonel Broadwood, who had been sent to garrison Thaba 'Nchu with a cavalry brigade, two horse batteries, and some mounted infantry, left the town on the night of 30th March, in consequence of the Boers approaching in force. He had taken the road to Bloemfontein, which was two days march distant, and at 4 a.m. had reached the waterworks, from which the drinking water for the town was supplied. He had pitched

his camp, and at daybreak was unpleasantly surprised by the sound of artillery fire, and by seeing shells falling among the tents.

It so happened that a strong Boer commando had, unperceived, followed the column at a distance, and having overtaken it soon after camp was pitched, sent a force to occupy a defile in the road by which the colonel must pass with his troops.

Finding himself attacked in rear, and not supposing that the head of the column had been overtaken, he started off his baggage and batteries without delay, preparing to fight a rear-guard action with his cavalry and mounted infantry. The wagons went on followed by the guns, but hardly had the column entered the defile, when it was surprised by the enemy in ambush. Mr. Burnham, an American, who was present, tells the story of how, as each wagon entered the narrow pass of Koornspruit, the Boers silently compelled the drivers to clear the road, so as not to stop the convoy, or give the alarm to the soldiers. When it came to the turn of the batteries, the fight began—a terrific struggle between the gunners who tried to save their guns and the Boers who were trying to capture them, with the result that seven guns were taken and five carried off in safety. 150 men were killed or wounded and 200 taken prisoners. All had been fighting hard for a short time round the guns and wagons in a very confined space.

Colvile's division arrived soon after mid-day. Lord Roberts had sent it out, being alarmed at the increasing numbers of the enemy to the east. As soon as he heard of the disaster, he despatched the other cavalry brigade, but the Boers had already carried off their booty, leaving behind only the wounded English—12 officers and 70 men.

Astonishment at this unfortunate affair had hardly subsided, when Lord Roberts had to telegraph accounts of another disaster. A detachment sent to Reddersburg from Bethanie, composed of three companies of the Royal Irish Rifles and two of mounted infantry, was surrounded by superior numbers of the enemy, and after fighting from three to nine on the morning of the 4th, had to surrender. Ten of the detachment were killed, including two officers; thirty-five wounded, and all the rest made prisoners. The Field-Marshal ordered General Gatacre to proceed at once to the assistance of his men, and sent a regiment from Bloemfontein; but all in vain, for when Gatacre arrived at 10 a.m., he found no one at the spot where the engagement had taken place. The impression produced by news of these two disasters was extremely painful. It recalled those dreary days of December, which, it was hoped, would never be repeated; for the public had become accustomed to hear only of victories, and thought the only thing needful was to march straight to Pretoria and finish off the war. Grief at the news was but little mitigated by reports of a success achieved by the Yeomanry and Cape Mounted Infantry, led by Lord Methuen in person. They managed to surround a party of raiders near Boshof, killed five of them, and took the remaining sixty-two prisoners. The Boers were under the command of Colonel Villebois-Mareuil, the ex-officer of the French Army, who was erroneously reported to be Joubert's chief of the staff.

The English public and the English press, in fact, all who were looking on at the great struggle in South Africa, had forgotten Methuen and Kimberley, and hardly seemed to remember that Mafeking was closely besieged, so intently was their attention fixed on that part of the Orange State between the Bethulie-Bloemfontein railway, the Orange River, and Basutoland, where the Boers had suddenly re-appeared in large numbers, and simultaneously at several different places. They raised the burghers who had apparently submitted, they attacked detachments, and even threatened the bridges over the Orange River. To attain these ends they displayed not only boldness, but rashness, for it was a question of reaching a certain spot and then retracing their steps, and they could not count on repeating Olivier's tactics with equal success. Lord Roberts had meanwhile re-organised his divisions and brigades, and even changed some of the leaders. He sent General Gatacre home immediately after the disaster at Reddersburg; he kept troops moving wherever danger threatened, especially along the railway, the only road by which he could get up stores for his army. It seems strange that, with all these raids by the enemy, no attempt was made to destroy the railway. This appeared to indicate that the burghers had other objects in view—probably to prevent acts of submission, to recruit armed men for the ranks, and to collect provisions from what is considered the most fertile district of the Free State. One of the columns sent to oppose the return of the enemy was detached from Brabant's Colonial division, which had gone to Aliwal North, after failing to catch Olivier. The detachment, under the orders of Colonel Dalgety, arrived in the beginning of April at Wepener, a little town on the borders of Basutoland, where they were in a strong position, and well supplied with food and ammunition. General Rundle, with the newly arrived 8th Division, marched to their assistance from Reddersburg, and Brabant with the remainder of his Colonial troops from Rouxville. At Wepener fighting went on nearly every day for three weeks, and the Colonial corps greatly distinguished itself. On the 23rd they still held the strong position at Jammersberg, though the troops sent to their assistance had not yet arrived, being delayed by the heavy rain, which fell in torrents from the 10th to the 20th, and rendered the roads impassable; besides which, they were opposed by the Boers, who took advantage of the bad weather to contest the advance of the English wherever they appeared.

Rundle's division had been stopped at Dewetsdorp, and Brabant had a two days' fight on the hills twelve miles south of Wepener. Meanwhile, Pole-Carew with the 11th Division, and two cavalry brigades under French, had gone to support Rundle, and with these forces it appeared they would be able to compel the Boers to abandon the blockade of the brave detachment under Colonel Dalgety. (As a matter of fact, Wepener was relieved on the 25th.)

The tide of war was flowing east towards Basutoland, and the most serious result was that the forward march of the army was delayed. All the nations of the world are looking on with astonishment at England, who has employed her whole army in this desperate conflict,

and has not gained a decisive victory. It will be remembered that at the beginning of hostilities she sent 25,000 men to drive out "the rebels," and that they were barely sufficient to prevent the said rebels from sweeping their rulers into the sea. More, and still more, troops were demanded and sent out, and together with those from Australia and Canada, with Volunteers from the Mother Country and the Colonies, they reached the total of nearly 100,000 men, with artillery of every kind, with pontoons and balloons, with telegraphs and heliographs, horses, provisions, and ammunition in abundance, but one disaster succeeded another.

Efforts were redoubled. New divisions were mobilised; the gentlemen of the Yeomanry volunteered; Canada, Australia, and New Zealand sent fresh contingents; new colonial mounted corps were formed; the numbers of field and Q.F. guns were increased, with howitzers and mitrailleuses in abundance; and, finally, not by force of numbers, but by the good sense of the Commander-in-Chief, the besieged towns were relieved, the enemy's territory was invaded, the Boer leader who had raided for months round Kimberley was defeated, and the capital of one of the Confederate States was occupied. But six weeks have passed and no progress is made.

The enemy have again displayed their former audacity; they attack columns on the march; they surprise garrisons; they capture guns and convoys; they take whole companies prisoners, and, emboldened by success, they scour the country now occupied by their conquerors.

The English do not advance, and when they do they have still to march 250 miles before they reach the capital of the larger Republic, the hated rival who beat them in 1881, and after whom the present struggle is called the Transvaal War. The territory of that Republic has not yet been trodden by the foot of the enemy. Thousands of English troops have arrived recently, bringing up the number to the unforeseen total of 200,000 men, of whom 150,000 are in the field. And even now the armed Boers are not over 36,000.

What does all this mean? It means that in those vast inhospitable plains without local resources, such plains as prevail in the greater part of Africa, where the lines of communication lengthen out, and distances are calculated by hundreds of miles, where there is no Nile to furnish means of transport and drinking water, millions of money and thousands of men are of no avail. In fact, the number of men causes enormous difficulties in feeding them and the animals, of which the English will have employed by the end of the war no less than 250,000. Then comes the arduous question of transport, difficult enough where there are roads and railways as in South Africa, but such as to paralyse operations where neither exist as in the Ethiopian highlands, and where the line of march is through a mountainous country entirely devoid of resources. Add to all this the revolt of the natives, which was latent both within and without the Orange State against the English, and which broke out openly in the rear and on the flanks

of the Italian expedition, and the conqueror will find himself in evil case.

Generals may be recalled and replaced by others from whom greater knowledge of the art of war is expected. We did so in 1896, and the English are doing so now, but the vast extent of country is not diminished, the distances remain the same, and the number of troops cannot be increased indefinitely, because (and it cannot be repeated too often) that would only increase the difficulties, which are already tremendous.

England has the means for overcoming these difficulties, because a complete railway system is available. She can employ her entire army efficaciously in the heart of the enemy's country. But the chances and changes in a long war against an invisible and enterprising foe might cause the undertaking to fail, in spite of the number and bravery of the troops and the ability of their leader, in a country so vast that the largest forces disappear as if by magic.

Spenser Wilkinson, the well-known writer in the *Morning Post*, reminds us that Napoleon arrived at Moscow with only 95,000 men of the 442,000 with whom he crossed the Niemen three months previously. That the 400,000 French who crossed the Pyrenees at various intervals, were reduced to 45,000 men under Masséna at Torres Vedras. Writing on 20th April, he says :—" Lord Roberts has now 100,000 men north of the Orange River. He is 100 miles from that river, but he has another 300 to march before he gets to Pretoria. The difficulties in moving the force are equal to, if not greater, than the French had to overcome in Spain in 1810, and in Russia in 1812, and the population, if not numerous, is as hostile as a people can be, who are not actual savages. Besides which, they are well armed."

When, and with how many men, will Lord Roberts reach Pretoria ?

(*To be continued.*)

COLLECTIVE PRACTICES.

By Major J. H. SWANTON, D.I.M., Western District.

THE proper performance of collective practices is really the outcome of perfect fire discipline.

The term "fire discipline," better expressed by the term "fire control," meets us at every turn. Whatever particular portion of musketry we discuss, with the exception perhaps of individual firing, is really all mixed up with that well-worn subject, and why? Because the aim and object of all our manœuvres and drills is eventually to bring such a superiority of fire on the enemy, whether in attack or defence, as will crush him in the end.

Strategy means moving the various portions of an army from a distance so that they can eventually meet the enemy and out-manœuvre him (as in the case recently of General French at the relief of Kimberley), but, when in touch with him, tactics step in to place the various units in positions where they can most favourably use their powers of offence and defence for the destruction of the enemy. Such was Lord Roberts's never-to-be-forgotten capture of General Cronje's army. It is then that discipline and collective practices come into play.

Now, let us take shortly what both the Infantry Drill-Book of 1896 and the Musketry Regulations, 1898, say on the subject of fire discipline, and then reproduce what the latter book says on the subject of "Collective Practices," and subsequently call attention to various more minute details, which are most essential to ensure the correct performance of these practices.

The Drill-Book says that fire discipline means:—

a. Strict attention to all orders from the commander.

b. Control of the amount and direction of fire.

c. Ensures careful adjustment of the sights.

d. Teaches the power of remaining under fire without replying to it.

e. And finally, in the din of battle, when casualties amongst officers and N.C. officers remove all superior control, enables the soldier to continue to deliver his fire in the best direction with deliberation and coolness.

And it goes on to say:—

"The physical strength and endurance of the attacking force are highly tried by the fatigue inseparable from a long advance under fire, and

the assault is consequently delivered under difficult conditions. These can only be counterbalanced by absolute obedience to orders, and strict fire discipline."

So much for the Drill-Book.

We now turn to the Musketry Regulations, 1898, and it is with these that we are most concerned.

In these Regulations the following will be found :—

"The general expression 'fire discipline' embraces the several connecting links in the chain of responsibility from the issue of the order to the actual delivery of the fire."

This is sub-divided into three heads, which are shortly reproduced as follows, viz. :—

1. General direction.
2. Judicious control.
3. Rigorous discipline.

Now, we are not actually discussing fire discipline, but we cannot altogether avoid introducing the term on account of its intimate connection with collective practices. The words "fire discipline" have never seemed to convey any distinct meaning. You have been given what our two text-books define "fire discipline" to be ; but as far as we are concerned the term "fire control" or "control of fire" is preferable, for, in order to be really effective, fire ought to be controlled, and well controlled.

Here is what the Musketry Regulations say on the subject :—

"Experiments have shown that if fired under similar conditions, a succession of controlled volleys, or independent (*i.e.*, collective firing), is more effective in the field than an equal number of shots fired individually. The introduction of smokeless powder has removed the great disadvantage which independent formerly laboured under, so that it might now with advantage be more frequently used ; moreover, in peace-time, statistics have proved that the results obtained may be better than volleys. But everything considered, volley firing is the description of fire (collective) generally employed, while independent is exceptional."

Some of the reasons for this are as follows.

Volleys admit of :—

1. Complete control of direction and of concentration of fire.
   N.B. Where it is not always possible to see the effect of a single shot, the effect of a volley may generally be noted.
2. Correction of elevation and direction.
3. Keeps men well in hand.
4. Is an aid to discipline.

Having thus alluded to "fire control," let us now turn to Table "B," Appendix VIII., Volunteer Regulations, 1899. There it will be found that out of the 42 rounds to be fired annually, 14 rounds are now to be fired in collective practices by all who wish to be classified as "Marksmen" (except colour-sergeants, sergeants, or lance-sergeants), and these must have commanded a section in firing 7 deliberate volleys at

500 yards, and 7 rounds in rapid independent also at 500 yards. Further, there is a footnote to the effect that if, owing to the want of range accommodation, which it is sincerely to be hoped may be of very rare occurrence, these 14 rounds should unfortunately have to be expended in individual practices, the scores will not count toward the figure of merit, or classification, and also that special arrangements must be made for these non-commissioned officers to command sections who will fire the collective practices with blank ammunition, thus showing how important the subject of collective practices is considered, *i.e.*, that if they cannot be actually gone through with ball ammunition on the range, the same procedure must be carried out with blank, in order that "fire control" can, at any rate, be practised.

In order to illustrate the importance of these practices, we may deal shortly with the three headings into which "fire discipline" or "fire control" is divided in the Musketry Regulations :—

1. *General Direction.*—This is amplified by the Regulations into the "intelligent general direction and regulation of fire on the part of the senior and subordinate officers and leaders."

The word "intelligent" means a great deal, especially when taken with the words "general direction and regulation of fire." It has been found, unfortunately, on more than one occasion that it is quite possible for those in superintendence to endeavour to generally direct and regulate fire without doing it "intelligently." To so do it means, in other words, "to use one's eyes." If superintending, observe the effects of the volleys. Should they fall short, use a long whistle, and increase the elevation, or, with "fixed" sights, direct the aim to be taken at a higher point on the target. It is, however, especially necessary to bear in mind that if after a volley has been fired, and no effect at all be apparent, it may be taken for granted that the elevation was too great, and the sight or aim should accordingly be lowered. This, however, depends on the nature of the ground both in front and in rear of the object. Such a case might easily occur with a rough sea in rear of the target, and it did actually happen on a West Country range last year, when six long-range volleys were fired at a target placed on the sea-shore at a distance of about 1,200 yards, but the bullets were not observed to strike anywhere. Had the elevation been decreased after each volley, as it should have been, the shots would in this instance have at last been seen falling short, and so the correct elevation might eventually have been found. That no attempt was made to do so showed want of "intelligent" direction on the part of those "generally" directing the fire.

There is one other point which should be impressed on those who are superintending a practice, and that is, if it be wished to correct a mistake, change the aim or description of fire, or should a "ragged" volley be fired, a long whistle must be blown at once for "cease fire." Then correct the mistake—change the objective, or endeavour to steady the section whilst the men are in the "ready" position; but, above all things, the section commanders or men must not be interfered with whilst firing is actually going on.

Officers at target practice should always be provided with field glasses, and should use them.

In the case of an officer commanding a company, the preliminary caution should be as short as possible. If deliberate volleys, it is sufficient to say:—"Volleys at the right, left," or particular portion of the target, "Fixed sight." Let the section commander do the rest. The reason this is mentioned is that some officers have been heard to say, "Volleys by sections commencing from the right, at the target," etc. Now, this is by no means wrong, but unnecessary, for it is a good thing to teach that volleys are always by sections or sub-sections, commencing from the right unless otherwise ordered, the "present" of the previous section being the signal for the "ready" of the next, and so on for the first volleys only. After that they are fired independently. There is an exception to this, and that is in firing long-range volleys, when the Musketry Regulations say:—"Only company or half-company volleys will be fired at this practice." Perhaps because the larger number of rifles fired together at a long range the greater the effect produced, and the easier it will be to observe the result.

2. *Judicious Control.*—This concerns section commanders more nearly. Almost everything depends on the way in which they handle their sections, and this is a fact which cannot be too strongly impressed upon them. If possible they should always remain in command of the same section, for it is a matter of considerable importance for the men who compose a section to know their commander's voice, as in this way the likelihood of one section taking the command to fire given to another as meant for themselves is reduced to a minimum. With a good section commander, good volleys, good results, and very much *vice versâ*. There is a great difference between "judicious control" and "injudicious control." What may be termed "injudicious control" is shown by a section commander who, though he may know his words of command, repeats them like a parrot and without using his eyes. Let us take, for instance, deliberate volleys at 500 yards. The injudicious commander says "Volleys—kneeling—ready—at the target," etc., all in one, without a sufficient pause between each, and without appreciating the difficulty there is for men to get into the kneeling position, especially with untrained men, and so on. What is the result that may be expected? He has not waited, first of all, to see his men at the "ready" comfortably, and does not allow for the fact that it takes time to get a cartridge out of the pouch, especially when there are a few in it. He does not see the sights properly adjusted (a most important duty of every section commander, who should go along his section and see this done), so that when the order "present" is given, perhaps half the section are still struggling with their cartridges, others are trying to close the breech or adjust the sight, and, in the end, perhaps one-third of the section may be got to the "present" in a very unsteady condition. In this perhaps slightly exaggerated case, the commander has been correct as far as his orders go, but without waiting for or appreciating the difficulties of his men.

What should be done is: Before issuing a fresh order, see that the previous one has been carried out. As, for instance, "Volleys—kneeling —ready," it should be seen that the men are in a good position on the knee, and comfortably sitting on their heels, and so on. One of the most important points is, however, the target to be fired at is a sectional one, 4 × 8 feet; but, though it is so large, it is easily missed at even the shortest ranges, hence it is essential that the exact portion of the target to be aimed at should be particularised, such as "at the bottom of the second figure from the left or right of the target," or "the right or left bottom corner," etc., according to the direction of the wind; and that the effect of the first volley or two be most carefully watched, in order that the correct elevation may be accurately obtained. If the whistle sounds the "cease fire," the men must at once come to the "ready" position and remain still, waiting for further orders, for this is the vital point of all fire discipline, viz., to be able to get men to stop firing instantly when ordered.

Finally, in giving words of command, let there be as little noise as possible. They should only be given loud enough to be heard by the section for which they are intended. With regard to "rapid independent." One of the principal dangers in connection with Volunteer rifle ranges is the fact that in charging magazines with rifles held as they are ordered to be at present, men are very apt to forget to close the cut-offs before closing the breech, so that a cartridge is forced into the chamber, and when springs are eased the rifle goes off, and then no one can tell where the bullet may go, or what damage it may do. To obviate as far as possible this danger, the officer in charge of a company should teach his men that after they have placed the requisite number of cartridges in the magazines, they should close their cut-offs only and remain still. The officer should then pass down the ranks, satisfy himself that all cut-offs are closed, and the men be instructed to close the breech and ease springs as he passes. In this way, what is in reality a great danger, can be considerably lessened, if not done away with altogether. In this practice, unlike the deliberate ones, the whistle is only used at the commencement and at the end of the one minute allowed for the firing of the seven rounds. This time is ample, and there is no necessity for hurry, for aim can be taken deliberately and accurately, and the rounds fired in the time allowed.

3. *Rigorous Discipline.*—Otherwise unhesitating obedience. This heading concerns the men themselves. It may be divided into:—

a. Getting into proper positions. With recruits a rigid compliance with the firing exercise is most essential. The positions given there are taken from what our best shots found most comfortable and steadying, and therefore they should be very carefully taught. Afterwards in the case of trained soldiers who are firing Table "B," it is not so necessary to insist on the regulated positions, because by then a man is supposed to have found that which, differing very little from the one laid down, is

most comfortable for himself, and so gives the best results. It is, however, to be borne in mind that the positions in successive firing exercises undergo slight alterations, each one supposed to be an improvement on those already in use, and in such cases it is well to get the trained soldier to conform to them.

b. In loading, those who have been accustomed to the Martini-Henry rifle find a difficulty in not forcing the cartridge into the chamber before closing the breech. This should be particularly avoided. Place the cartridge on the cut-off in front of the bolt, and then force it home with the same. Otherwise the extractor may not get hold of it, and a jam will occur.

c. When the long whistle sounds, return to the "ready" position, and remain still.

In conclusion, it must be understood that we have been dealing with the Musketry Regulations as they now are, and as we have still to teach them. We are, of course, not in a position to state what effects the present war may have on them; but though individual fire will in all cases have first to be taught, it is in the controlled collective practices that we have shown, and will, we hope, still continue to show, our superiority over an untrained foe, because well-regulated fire is the outcome of perfect discipline, and it was perfect discipline that kept our men on several occasions recently, lying in exposed positions under an appalling fire, and firing themselves for a whole day in a burning sun, as at the Modder River under Lord Methuen, and the Tugela under General Buller.

From an intelligent and graphic account by an officer who took part in the battle of Graspan, it would appear to be more than probable that volleys will either not be used at all in the "attack," or that they will be done away with within 800 yards from the position, for in that action, and no doubt in many others too, it was found that owing to the noise of firing and the distance of the men apart, controlled independent had to be resorted to from about 700 yards. In the defence, volleys at ranges from 1,500 to 1,200 yards may still be retained and be found effective, when the men are well placed under cover and close together, against objects forming large targets, such as troops in close columns; but on the whole it would seem that controlled independent will, at medium ranges, in future give the most satisfactory results.

NAVAL NOTES.

HOME.—The following are the principal appointments which have been made: Captains—H. A. Warren to "Vindictive"; C. H. Dare to "Bellona." Commander—A. T. Taylor to "Hebe."

The second-class cruiser "Diana" arrived at Portsmouth on the 3rd ult. from Australia with relieved crews from ships on that station, and paid off at Chatham on the 30th ult. On the 4th ult. the first-class cruiser "Argonaut" and the new first-class gun-boats "Britomart" and "Bramble" left for China. On the 30th ult. the third-class cruiser "Pegasus" arrived at Spithead from the south-east coast of America, and proceeded on the following day to Chatham, where her officers and men will turn over to the second-class cruiser "Sappho."

Naval Manœuvres.—The annual mobilisation for the manœuvres commenced on the 10th ult., and was carried out successfully, all the vessels leaving for their respective rendezvous within the 48 hours. Hostilities commenced on the 24th ult., and came to a conclusion on the 3rd inst., the results, as far as we know at present, being as usual indecisive.

The following are the Regulations issued relative to the Naval Manœuvres:—

Object.

The principal object of the manœuvres is to obtain information relative to the working of a fleet, which is composed of vessels of all classes, and is fighting for the command of the sea.

The most suitable distance at which to establish a temporary base for a squadron watching a hostile fortified port is a subsidiary question.

The power which cruisers may or may not possess of hunting down and driving torpedo craft into port is another important point.

General Idea.

A fleet (B) is divided into two squadrons: B1 at Milford, B2 at Lamlash.

A hostile fleet (A), inferior in battle-ships to (B), is also divided into two squadrons: A1 at Berehaven, A2 at Lough Swilly.

A hostile reinforcement (A3), which will make A1 + A2 + A3 nearly equal to B1 + B2 in battle-ships, is expected from the Mediterranean.

The whole of Ireland is hostile territory, and belongs to (A). The whole of Great Britain from Cape Wrath to the Land's End, the Isle of Man, and the Scilly Islands belong to (B).

The fleet (B) has destroyers.

The hostile fleet (A) has torpedo-boats, supported by fast small craft.

The following ports are fortified, and will be placed in a state of defence:—

In Great Britain: Milford Haven.

In Ireland: Berehaven, Queenstown, Lough Swilly.

All other ports, including Lamlash, are unfortified.

Each fleet will try to obtain command of the sea, that is to say, will endeavour to defeat the other, to shut him up in his ports, and especially to clear the sea of his torpedo craft.

Rules and Regulations.

The following are the rules and regulations to be observed during the manœuvres :—

The manœuvre field is bounded on the west by the 20th meridian; on the north by the 60th parallel; on the east by the 5th meridian as far as Cape Wrath, by the west coast of Great Britain, and by the meridian of the Lizard Head from that point to the southward; on the south by the 45th parallel.

The signal stations marked on the special chart issued with the instructions for the distribution of intelligence will alone supply information during the manœuvres.

As soon as the whole of the ships and vessels composing the two fleets, together with the destroyers and torpedo-boats, have arrived in port, a telegram will be sent from the Admiralty naming the hour when hostilities are to commence.

No vessel of any class is to put to sea before the hour named for the commencement of hostilities.

Battle-ships are to complete with coal on arrival at their base ports before again putting to sea.

All battle-ships are to be considered equal in fighting power to the "Majestic."

No rules setting forth the conditions under which ships will be put out of action will be issued. Each case must be decided by the umpires on its merits on the basis of what would be probable in war.

When two or more ships come into action the commencement of the engagement is to be marked by the firing of a gun by one of the ships engaged. During the engagement single guns are to be fired at five-minute intervals by one ship on each side.

When either side considers that he has beaten the other he should signal "Propose reference to umpires." If the other agrees to the reference the action is to cease. If the other does not agree the action may continue, but not for more than a reasonable time, which is to be determined by the senior officer present. A reasonable time under ordinary conditions would be one hour in the case of battle-ships, cruisers, and torpedo gun-boats, and half an hour in that of destroyers and torpedo-boats.

When reference to the umpires has been settled the senior officer present is to determine what ships on either side are to proceed into port to await their decision, pending which the ships detached are to be considered out of action. The senior officer present must take care to select as far as possible equally from both sides.

If a ship is undoubtedly torpedoed, or manifestly overpowered by a much superior force, the senior officer present may take the responsibility of temporarily putting such ship out of action and ordering her into port for the decision of the umpires. In this case it will not be obligatory to order into port a ship from the opposite side.

Ships put out of action can take no further part in the manœuvres, but must return to one of their base ports—Milford, Lamlash, Berehaven, or Lough Swilly—flying the Blue Peter at the fore. They are to select a route as far as possible clear of the scene of operation, and are strictly enjoined not to communicate any information to the ships on either side which they may meet on the way.

Colliers, after reaching Milford, Lamlash, Lough Swilly, Berehaven, or Queenstown, are open to capture; the captors can use the coal in them.

Colliers are not to be interfered with after they have discharged their cargoes.

Signal stations are not open to attack by landing parties.

As the 18-inch torpedo cannot be fired at a ship in a peace exercise, a destroyer is to fire a blue light by night or blow her whistle by day at the moment when the torpedo would be discharged, the tube being trained and all adjustments made as if actually firing.

Torpedoes fitted with collapsible heads may be fired at battle-ships and cruisers, but not at torpedo-gunboats, destroyers, or torpedo-boats.

Torpedo-boats are not to paint out their numbers.

As it is assumed that the command of the sea is disputed, care should be taken not to expose vessels needlessly to fire from forts.

LIST OF SHIPS.

Fleet A.	*Fleet B.*
A1.	B1.
Majestic.	Alexandra.
Repulse.	Colossus.
Dreadnought.	Rodney.
Sultan.	Howe.
	Collingwood.
A2.	Camperdown.
Prince George.	Hero.
Resolution.	Thunderer.
Edinburgh.	Superb.
Conqueror.	
	B2.
A3.	Sans Pareil.
Magnificent.	Nile.
Jupiter.	Trafalgar.
Hannibal.	Benbow.
Mars.	
Cruisers.	*Cruisers.*
Diadem.	Ariadne.
Blake.	Blenheim.
Edgar.	Hawke.
Gibraltar.	St. George.
Immortalité.	Galatea.
Gladiator.	Vindictive.
Talbot.	Minerva.
Furious.	Cambrian.
Naiad.	Rainbow.
Sirius.	Melampus.
Apollo.	Andromache.
Retribution.	Medea.
Phœbe.	Medusa.

Flotillas.

Pactolus, Perseus, Pioneer, Spanker, Sheldrake, Seagull, Skipjack, Jason, Hecla	42, 49, 50, 59, 66, 71, 76, 77, 81, 82, 83, 84, 63, 64, 68, 74.	Brilliant, Alarm, Renard, Leda, Circe, Jaseur	Portsmouth and Chatham Divisions of Destroyers (16 in number).
Mersey, Prometheus, Speedwell, Sharpshooter	45, 52, 53, 55, 57, 58, 85, 86.	Severn, Antelope, Gleaner	Devonport Division of Destroyers (8 in number).

INSTRUCTIONS RELATIVE TO UMPIRING.

The following officers are nominated to act as umpires:—

Vice-Admiral Sir Compton Domvile, K.C.B.

Rear-Admiral C. C. Penrose Fitzgerald.

Rear-Admiral A. D. Fanshawe.

Lieut.-General J. F. Owen, R.A., is nominated by the War Office to act as military umpire to decide, jointly with the naval umpires, claims arising between the land defences and the ships.

They will meet at the Admiralty, Whitehall, where all claims and statements for their consideration should be sent, addressed to the "Secretary of the Umpires." Claims, etc., are to be sent in as soon as possible after the events to which they refer on the form provided for the purpose. They should be accompanied by extracts from the ship's log or signal log, by track charts when necessary, or by other documentary evidence likely to assist the umpires in arriving at a decision. Claims, etc., sent by telegraph must be followed by the same claim, etc., on the proper form, sent by the first post.

The decisions of the umpires are final.

Umpires will not make known their reasons for arriving at a decision.

No reference will be made by them to the Admiralty before arriving at a decision.

The decisions of the umpires will be communicated to the Admiralty as soon as possible after they had been arrived at, in order that, if desirable, they may be made known to the senior officer on each side.

Should the Admiralty desire to communicate with the fleets during the progress of "hostilities," and their instructions be conveyed by a ship attached to either of the opposing forces, or by any other ship, such a ship is to display the signal A.K.H.

It will thus be known that she is acting under Admiralty Orders, or is about to deliver despatches or telegrams, or to signal orders received from the Admiralty, and the respective admirals and senior officers are to take the necessary steps to ensure that the orders so communicated are forwarded and acted on without delay.

If the commanding officer of one vessel sights another flying the signal A.K.H., he is at once to close her so as to place himself at a convenient distance for communicating by signal, should it be necessary.

General Orders and Instructions.

A partial mobilisation of the fleet for manœuvres will take place this year. The vessels mobilised will be attached to the Channel and Reserve Squadrons. They will assemble as soon as ready under the orders of the flag officers in command at Portland and Torbay respectively, and will be formed in two fleets, to be known as Fleet A and Fleet B respectively.

At the time appointed the main fleets will proceed to sea for the usual preliminary cruise, during which the ships will be exercised and anchored at the discretion of the admiral in command.

Two flotillas, composed of cruisers, torpedo-gunboats, and destroyers, will be attached to B fleet.

The vessels belonging to these two flotillas will assemble at Torbay, and will be organised thus:—

"Severn," two torpedo-gunboats, Devonport division of destroyers.

"Brilliant," five torpedo-gunboats, Portsmouth and Chatham divisions of destroyers.

They will then proceed as follows:—

"Severn" and flotilla to Lamlash;

"Brilliant" and flotilla to Milford Haven;

where they will be exercised and will coal, care being taken that all are complete with coal before the commencement of hostilities.

Two flotillas, composed of cruisers, torpedo-gunboats, and torpedo-boats, will be attached to A fleet.

The vessels belonging to these two flotillas will assemble at Devonport, and will be organised thus: –

"Pactolus," "Perseus," "Pioneer," "Hecla," five torpedo-gunboats, Portsmouth and Chatham divisions of torpedo-boats.

"Mersey," "Prometheus," two torpedo-gunboats, Devonport division of torpedo-boats.

They will then proceed as follows :—

"Pactolus" and flotilla to Berehaven ;

"Mersey" and flotilla to Lough Swilly ;

where they will be exercised and will coal, care being taken that all are complete with coal before the commencement of hostilities.

Any portion of the Berehaven flotilla can be sent thence to Queenstown, provided that it arrives there and is completed with coal before the commencement of hostilities.

At the termination of the preliminary cruise the ships forming Fleet A will be formed into three divisions, and those forming Fleet B into two divisions. They will then be detached to the following base ports :—A1 to Berehaven, A2 to Lough Swilly, A3 to a rendezvous, B1 to Pembroke, B2 to Lamlash.

The order to commence hostilities will be sent on the day on which the ships arrive at their base ports.

The period of active operations will last ten days. On the conclusion of the manœuvres the ships and vessels will proceed to carry out target practice, separately in the case of the mobilised ships, ample time being allowed for the careful performance of the practice ; in the case of other ships, separately or in company, at the discretion of the admiral in command.

Only one-half of a quarter's allowance of ammunition is to be expended from the heavy, light, Q.F., and machine guns of the mobilised ships.

A full quarter's allowance of ammunition may be fired from destroyers and torpedo-boats if considered desirable by the officer commanding the flotillas.

Only such naval stores as are necessary to keep destroyers and torpedo-boats efficient during the manœuvres are to be embarked in the depôt-vessels "Hecla," "Mersey," "Severn," "Brilliant," during the mobilisation. No ordnance or torpedo depôt stores will be required.

A copy of the ship's and signal log of every vessel taking part in the manœuvres, commencing 12 hours before and ending 12 hours after the active operations, is to be sent to the Admiralty with the report of the admiral in chief command of each fleet.

Umpires' Report on Naval Manœuvres of 1899.—A Parliamentary paper has been issued on the subject of the naval manœuvres of 1899. The principal object of the manœuvres was to obtain information as to the most advantageous method of employing a considerable body of cruisers in conjunction with the fleet. Subsidiary objects were to throw some light on the relative advantages and disadvantages of speed and fighting strength, and to obtain information relative to the working of destroyers and torpedo-boats.

The following officers acted as umpires :—Vice-Admiral Sir C. A. G. Bridge, Rear-Admiral John Fellowes, and Rear-Admiral S. C. Holland. The General Idea of the manœuvres was :—

A British convoy "C" of slow ships escorted by a fast cruiser, on passage from Halifax to Milford Haven, is ordered to wait at a certain rendezvous the arrival of a protecting squadron.

N.B.—The slow ships cannot be taken in tow, must remain in company, and have no fighting value.

A hostile squadron "A" (Channel fleet) of fast ships, lying at Belfast, is sent to sea to intercept and capture the convoy and bring it into Belfast.

After an interval, a superior British squadron "B" (Reserve fleet) of slower ships is sent to protect the convoy "C," which has been ordered to a prearranged rendezvous, cover it from the hostile squadron, and bring it into Milford.

The whole of Ireland is hostile territory, and belongs to "A."

The coast of England and Wales from the Island of Islay to the Lizard, including the Scillys and the Isle of Man, is British territory.

The hostile fleet "A" has torpedo-boats at Waterford, Kingstown, and Belfast.

The British fleet "B" has destroyers at Milford Haven, Holyhead, and Lamlash.

The following passages are taken from the umpires' report:—Two fleets, "A" and "B"—the latter with a larger number of ships of less speed—each with a flotilla attached, were constituted for the purpose of the operations. "Hostilities" began at 10 a.m. on Saturday, 29th July, the "A" fleet being then at Belfast, and the "B" fleet at Milford Haven. The "A" fleet put to sea as soon as the "war" began. On the following day (30th) at 5 hours 20 minutes a.m., the "B" fleet was ordered to sea, and having fallen in with the convoy which it had gone out to meet, succeeded in bringing it into Milford Haven at 11 a.m. on 3rd August. On this, in accordance with the printed "General Orders and Instructions," the operations terminated. With reference to the most advantageous method of "employing a considerable body of cruisers in conjunction with a fleet," and to the "relative advantages and disadvantages of speed and fighting strength," we have no information which would enable us to form an opinion. As regards the claim for the Bere Island signal station, we would observe that—though the main object of the captors, namely, getting possession of the signal books and instructions, was not attained—the capture and occupation, even for a limited time, of an enemy's signal station would be likely to have considerable influence on the course of a particular set of operations. The work of the umpires was facilitated by the careful and minutely detailed manner in which a large number of the statements of claims were drawn up. As many of these came from torpedo-boats, where the conditions are not favourable to the composition of minutely elaborated reports, or to the preparation of carefully executed illustrative plans, we would submit that this is creditable to the officers concerned.

Three claims for putting vessels out of action were allowed to "A" fleet and nine to "B" fleet.

RUSSIA.—The following are the principal appointments which have been made: Captains — Matusevich, to first-class cruiser "Rurik"; Serebrennikov to first-class cruiser "Rossia"; Rolands, flag-captain of the Shore Staff of the Black Sea Squadron.

Torpedo-Vessels.—The torpedo-vessels now under construction at the Neva Yard, viz., the "Baklan," "Bekass." "Gorlitsa," Grach," "Kulik," "Perepel," "Skvorets," "Strij," and "Shchegol," are to be of 350 tons displacement. Their chief dimensions are as follows:—Length, 210 feet; beam, 21 feet; speed, when laden to a draught of 5 feet 10 inches, 26 knots. The propellers are protected as in vessels of the "Sokol" type, the steering apparatus and its defence are of forged steel, while the coal capacity is 80 tons. Each of their compartments will be fitted with a turbine capable of ejecting 80 tons of water an hour, and there will also be seven 5-inch hand-pumps each, worked from the upper deck. There will be three torpedo-discharges, and the armament will further consist of one 75-millimetre gun and five 47-millimetre guns. The engines are vertical with triple expansion; the diameter of the cylinders being:—Fore, 20½ inches; amidships, 31½ inches; and aft, 34 inches, the cylinders being of iron cast in one piece. The propellers have three blades of manganese bronze, and the outer surface of the screws will be fitted with the Williams apparatus. The boilers are o the Jarrow type, four in number, and their united grate area about 12,800 feet, while that of the furnace grate is 240 square feet, and the working pressure 250 lbs. The electric lighting is supplied by a dynamo of 100 amperes, and 100 volts, with a steam propeller. The deck is lighted by forty incandescent lamps. The projector is of 60 centimetres. The first of them is to be ready for launching by July of this year, and the remainder by May, 1902.

A large torpedo-destroyer, to be christened the "Som," is expected to be delivered this summer at Kronstadt, having been launched at Birkenhead by Lairds in July, 1899. Her length is 213 feet; draught amidships, 21 feet 6 inches; beam amidships, 12 feet 9 inches; and mean draught, 6 feet 3 inches, with a displacement of 350 tons. Her engines, which are of triple expansion, and with surface cooling, are to develop at forced draught an I.H.P. of 6,000 and a speed of 30 knots, when the vessel is somewhat lightened, and under ordinary seagoing conditions 27 knots, while her sphere of action at 15 knots speed will be 3,500 miles, with a coal supply of 80 tons. The hull is constructed of Siemens-Martin steel, and all the transversal and longitudinal bulkheads for the coal bunkers are water-tight, the hull being divided into eleven principal compartments, extending to the upper deck, the total number of compartments being 23, the engine and each pair of boilers being placed in a separate one. The deck forward is of a turtle shape, her bulwarks are of plates of $\frac{1}{2}$ inch thickness, and the boilers are water-tube on the Laird system, with a pressure of 250 lbs. to the square inch, made of the best Siemens-Martin steel. A speed of 27 knots will be ensured by a three hours' trial over the measured mile used by the English Admiralty, under a pressure of air in the stokeholds not exceeding 4 inches of water. The propellers, of three blades, are to be made of bronze, and there will be four funnels. She is to cost £52,000, and her torpedo gear will consist of three ejecting tubes. For each $\frac{1}{4}$ knot short of the 27 knots stipulated made on the trials the firm is liable to a fine of £2,000, and if less than 26 knots are attained, the Russian Government will be at liberty either to reject the vessel or accept her at 20 per cent. less than the contract price. There is a warranty of the engines for six months from the date of taking over. After receiving her armament at Kronstadt and final overhauling, she will probably proceed to the Pacific.

The Salvage of the "General-Admiral Apraxine."—A few details with regard to the work of the "Yermak" in towing the battle-ship "General-Admiral Apraxine" from Hogland to Aspö may not be uninteresting. After the ship had been raised out of 45 feet of water and put on an even keel, the "Yermak" was sent to Aspö to ascertain the feasibility of the ironclad being taken into that harbour under the conditions then prevailing with regard to ice, and as the usual pilots were absent the observations had to be taken by her officers. On the strength of their report to Rear-Admiral Rojestvenski, the latter decided on an immediate start, and as the ice might endanger the vessel, she was to be at once run aground. Accordingly, about 9 a.m. on the 25th April, the ship under her own steam got under way at a low rate of speed, the "Yermak" towing ahead. The weather was awful, there being a strong N.E. gale, and such heavy drifting snow that objects were scarcely discernible at a cable's length. The ice-pack penetrated by the "Yermak" the day before had shifted under a N.E. current a mile to the westward, so that a new opening had to be made through it. More than once a huge ice-floe, piercing the lines of tow-ropes, caused serious anxiety to those in charge of the battle-ship. Soon after 4 p.m., however, thanks to the guiding posts set up by the "Yermak," the big ship succeeded in entering the inner roadstead at Aspö without mishap. Next day the "Yermak" proceeded to the southern extremity of Hogland to pick up the gear which she had been forced to leave behind owing to her hasty departure. To the astonishment of her commander and all those on board the scene had totally changed in the meantime, and where the day before there had been huge masses of ice all was now clear, as if there had never been an ice-carpet there. This was a sure proof of the force of the set of the ice. Great praise is due to Rear-Admiral Rojestvenski for getting the ironclad out of its ice prison in such good time, thus preventing the fruits of the ceaseless labour of five months being wasted. Having transferred the gear she had fetched to the "Apraxine," the "Yermak" left for Kronstadt, which she reached on 28th April.

New North Pole Expedition.—An interesting lecture was delivered in May at the Kronstadt Naval Institute by Baron Toll on "The Objects of the Polar

Expedition fitted out by the Academy of Sciences." The members composing it are as follows:—The Baron himself, the commander; Lieutenant Kolomeitsev, second in command; Lieutenant Mathiesen, in charge of the meteorological, geodetical, and photographic work; third officer, Lieutenant Kolchak, in charge of the survey branch; Candidat Zeberg, as astronomer and compass officer; the Zoologist Bialynitski; and surgeon, Dr. Walter. These have all taken part in previous expeditions of the kind. The crew has been selected from the Fleet in general, and is exclusively composed of men belonging to the seafaring population of the Government of Archangel. One of them has wintered in Franz Josef Land, and another in Novaia Zemlia. There are thirteen in all, besides a Yakutsk Cossack as interpreter, who has previously accompanied Baron Toll to the New Siberian Islands. They are taking provisions of all kinds for 1,200 days, and sixty Eskimo dogs for land work. The "Zaria," which carries them, was purchased in Norway at a cost of 60,000 roubles, and is built on the lines of a Norwegian sealing schooner, but is being altered for the purposes of the expedition, at Laurvik, by the builderof the "Fram," Archer, under the supervision of the commander. Special warm rooms will be erected on board for zoological, bacteriological, hydrographical, and geological work, lit by electric light. The Expedition proposed to start from St. Petersburg at the beginning of June, and make for the north of Norway as far as Tromzö, put into Ekaterinine Harbour, reaching the Gulf of Yugor Shar by the middle of July, and then, by the Kara Sea, proceed past Cape Chelinsk, which they will double toward the end of August, and look for a harbour on the north-east coast of the Taimir Peninsula. There they will erect winter quarters, and also a magnetic and meteorological observatories, and carry out a complete survey of the Peninsula. Next year, as soon as navigation becomes practicable, viz., in August, they will proceed past the mouth of the Lena and the New Siberian Islands to the north and north-east, and endeavour to find Somnikov Land, which was sighted by Baron Toll in 1886, and has never yet been explored; Bennet Island, discovered by the Americans, and then endeavour to push still further to the north, into the wholly unknown Arctic regions, where the "Jeannette" was lost in 1881, and the course of the "Fram." There they will again select a suitable spot for wintering, and setting up a magnetic and meteorological station. During their ten months' stay they will make various trips on foot, and with dogs and sledges, and decide the question how far north the above-named islands extend.

On navigation becoming practicable in 1902 they will follow the course of Nordenskiöld's "Vega" through Behring Strait to Vladivostok. In case of disaster there are in the New Siberian Islands three depôts of provisions, formed in 1893 by Toll for Nansen, which will be inspected afresh and replenished with tinned foods this summer.

In 1901, Candidat Volossovich will form an auxiliary party, which will proceed on sledges from Siberia to the mouth of the Yana and explore the New Siberian Islands. Simultaneously with the work of the expedition, magnetic, meteorological, and physical observations will be taken at stations erected at Verkhoyansk, Ustiansk, and the mouth of the Indighirka. Special attention will be given by the explorers to geological observations, as also zoological and bacteriological. The lecture concluded with hearty good wishes from Vice-Admiral Makarov to all the members of the expedition.

Fleet against Forts.—A lecture of some interest was delivered a short time ago at the Naval Institution by Lieutenant Klado on "A Fleet as Matched with Forts," in which it was laid down that an attack on a land fortress was preparatory either to a descent or a bombardment. The latter could have no material effect on the fortunes of a war, and should be attempted only when the enemy's main forces were already broken. The lecturer considered that matters were now pretty evenly balanced between shore defences and a squadron, at least there was no very marked preponderance on either side. The advantage of the ships lay in the

fact that they were mobile and the conduct of the defence must be dictated by the tactics they might choose to adopt, and any unexpected move on their part might upset all calculations of the artilleryman on shore. Besides, very many land forts had guns of a more or less obsolete pattern, as, in the Spanish-American War, was the case with the fortification of Cuba, though the Spanish squadron had weapons of the latest type. The forts, however, were better protected, and afforded a stable gun-platform. Both sides were in the disadvantageous position of knowing nothing of each other's strength or dispositions. At Kronstadt and Nicolaiev the seaward guns, which were of the most modern pattern, were carefully practised with every year, and statistics kept of the results, but these were a State secret. There was consequently a discrepancy of calibres between naval and shore guns. The initiative was always with the fleet as the attacking party, and it could chose the most favourable moment for striking. Dismounting guns in batteries, he thought, was problematical. As to the distance the ships should stand in to, if further off than fifteen cables, however powerful the guns of the fortress, the loss to the ships was very doubtful. But all must depend on the construction of the works attacked. He then dwelt on the advantage of manœuvring at an angle, the distance then changing in inverse ratio to the speed. He strongly deprecated night attacks, as the ships did not know the manœuvring field, and so lost mobility. In the daytime it was always possible to chose your time so as to place the ship between the sun and the enemy. Balloons should be employed to reconnoitre, and the best time to attack was at daybreak. In case of success, a landing should at once be made, and the batteries, if possible, captured, and then care must be taken to secure your position. The best order in which to attack was line ahead. Incidentally he noticed, in connection with manœuvring, the excellent steering gear invented by Commander Ivkov. He concluded by laying down the sort of training desirable for such attacks. Extensive operations by divers and blasting having been going on during winter in Kronstadt Harbour, especially the Greater Roadstead, by the Navarine Reef. From an area of 77,900 square fathoms, 223 boulders, of a total weight of some 400 tons, have been displaced, which lay in a depth in ordinary tides of from 30 to 33½ feet; the target was 5¼ feet in height, and weighed upwards of 8 tons. Five were too heavy to be moved by the crane, and will be blown up in the course of the summer. More recently operations have been commenced in the Eastern Roadstead, the results of which have not yet come to hand.

General.—During a recent visit of H.I.H. the General-Admiral Grand Duke Alexis to Kronstadt he paid especial attention to a contrivance for exercising naval gunners in firing light guns at night during the winter. In the summer cruises firing by night receives as much attention as practising in daylight. So far the lighter guns, which have for some time past been exercised in firing with Orlov cartridges, have not been fitted with a luminous sight, but a certain Captain Spynev of the Marine Artillery, has invented one. The men of the 16th "Equipage" (battalion of seamen) have been practising with the new apparatus (apparently something like the Morris tube) at a moving model of an ironclad lit by an acetylene lantern. Hits are notified by swinging metal discs, fastened on a metal button, behind which is placed a plate with round apertures in it. All along the bulwarks and principal parts of the target-ship are placed paper pistons, and when the shots hits one of the swinging discs it pushes it aside and exposes the lighter opening behind, and entering the piston produces an explosion. If two shots hit two pistons close together, the effect is just like the fire produced by the bursting of a shell. Sight and target are lit up by a special apparatus invented by Commander Yakovliev, consisting mainly of platinum wires.

The printing of charts from aluminium plates has been introduced in Russia, and gives great satisfaction. The old stones were too cumbrous, took up much room, and were very dear. The new plates have been introduced from Mayence, and one that was examined recently by the Emperor, though 500 impressions had

been taken from it, was still in a condition to furnish even a larger number. The plates have been entirely executed and planned by Russian artificers. The method will admit of ships being for the future more frequently furnished with new charts with all the latest emendations.

During the Crimean War an English vessel was wrecked off Balaclava, which has so far not been raised again, in spite of repeated attempts. An Italian salvage company has applied to the Italian Consul-General at Odessa for leave to approach the authorities with a view to raising her, and his mediation has resulted in permission being granted, and a contract has been signed by which 10 per cent. clear profit from the salvage will be handed over to the authorities. Operations have already been commenced, and it is said that there were several pounds sterling on board the sunken vessel, intended for the use of the British fleet.—*Kronstädtski Viéstnik.*

SWEDEN AND NORWAY.—*The Naval Estimates.*—The Ordinary Estimates for the current year amount to 8,692 395 kronen (£482,911) and the Extra-Ordinary to 13,472,105 kronen (£748,450). The principal items in the Ordinary Budget are as follows:—Ministry of Marine and Administration, 85,900 kronen (£4,772); pay for officers and men (Navy), 2,544,482 kronen (£141,360); for Carlskrona artillery corps, 293,795 kronen (£16,322); clothing, etc., 323,060 kronen (£17,948); maintenance of fleet and new construction, 1,725,000 kronen (£95,833); ships in commission and training of the fleet, 870,000 (£48,333); naval schools, 52,120 kronen (£2,895); surveying service, 65,000 kronen (£3,611); mercantile marine, pilots, lighthouses, schools for navigation, meteorological bureau, etc., 1,623,709 kronen (£90,205).

The principal items of the Extra-Ordinary Budget are as follows:—A second and last vote for new battle-ships, A, B, and C, and four torpedo-boats, 7,823,500 kronen (£434,639); a second and last vote for reconstruction of the battle-ships "Svea," "Göta," and "Thule," 2,420,000 kronen (£134,444); first vote for reconstruction of the monitors "Thordön" and "Tirfing," 100,000 kronen (£5,555); ammunition, etc., 315,000 kronen (£17,500); armament of the fortifications of Carlskrona and Farösund, 825,000 kronen (£45,833); submarine mines, etc., 200,000 kronen (£11,111); coal reserve, 628,145 kronen (£34,897); boom defence at Gothenburg, 730,000 kronen (£40,555).

New Ships.—The three new battle-ships, A, B, and C, for which a total sum of 15,000,000 kronen (£833,333) will be required, are to be vessels of the same type and the same dimensions as the "Dristigheten," now being completed by the Lindholm shipbuilding firm at Göteborg. Their dimensions will be as follows:—Length, 287 feet; beam, 49 feet 3 inches; displacement, 3,670 tons, with a draught of 16 feet 5 inches. The engines are to develop 5,500-I.H.P., giving a speed of 16·5 knots with natural draught and 17·5 under forced, steam being provided by water-tube boilers of the Yarrow type. The ship will be protected by a water-line belt two-thirds the length of the ship 7·8 inches in thickness, the barbettes for the two heavy guns being protected by armour of the same thickness, the casemates for the secondary battery of 5·9-inch Q.F. guns having 5-inch armour, with 4-inch ammunition tubes. The armament will consist of two 21-centimetre (8·2-inch) guns in barbettes, one forward and one aft; six 15-centimetre (5·9-inch) Q.F. guns in casemates; ten 5·7-centimetre (2·2-inch) and two 1·4-inch small Q.F. guns, with two machine guns and two submerged torpedo-tubes. In these newer ships the size of the heavy guns has been decreased, while the secondary armament has been increased. This has been done in consequence of the recommendations of a committee which sat some two years ago to inquire into this question, and who reported:—1. That Q.F. guns of medium calibre, when protected by armour, were of undisputed importance in action. 2. That Q.F. guns even of small calibre were effective against the unarmoured parts of ships and against guns' crews not properly protected.

3. That heavy guns relatively speaking, made a much smaller percentage of hits. The three ships are being built by the Kochum, Bergsund, and Lindholm shipbuilding companies respectively. The 21-centimetre and 15-centimetre guns, with the 5·7-centimetre guns, are being constructed by the Bofors-Gullspang and the Stockholm and Finspong foundries. A modification in the armament of the "Svea," "Göta," and "Thule" is also being made, with the view of increasing the strength of the secondary battery.

The two new torpedo-cruisers, "Clas Uggla" and "Psilander," are to be supplied with Yarrow water-tube boilers, the engines being intended to develop 4,500-I.H.P., to give a speed of 20 knots.

A small turret-ship, which was christened the "Norge," was launched from the Elswick Yard, Newcastle-on-Tyne, on the 31st March, for the Norwegian Navy. She is the third war-ship built by the Elswick firm for the Norwegian Navy, while a fourth is at present on the stocks. The vessels previously launched were the "Tordenskjold" and the "Harald Haarfagre." Her dimensions are as follows:—Length, 290 feet; beam, 50 feet 6 inches; draught, 16 feet 6 inches, with a displacement of 3,850 tons. She is to be armed with two 21-centimetre (8·2 inch) Q.F. guns, six 15-centimetre (5·9-inch), eight 12-pounders, six 3-pounders, and two torpedo-tubes (submerged). The vessel has an armour belt of Harveyized steel 6 inches in thickness. The casemates, four in number, are of nickel-steel armour 5 inches thick. The barbettes are of nickel steel, 6 inches thick. The machinery is of the twin-screw vertical triple-expansion type, with Yarrow water-tube boilers, to develop 4,500-I.H.P., giving a speed of 16·5 knots.

The new torpedo-boats under construction are to be named "Laks," "Sild," "Sael," and "Skrei." A new floating dock is being constructed at Sandefjord; it will be 228 feet long, 64 feet beam, and a lifting capacity for ships of 1,600 tons, with a draught of 15 feet. The Admiralty have decided to abolish all fighting tops in the Navy.—*Mittheilungen aus dem Gebiete des Seewesens* and *Marine Rundschau*.

UNITED STATES.—*Report of the Chief of the Bureau of Equipment for 1899.* - The importance of outlying coaling stations to a Navy, and the necessity for this Government maintaining a large number, is the principal theme of Admiral Bradford's report, as Chief of the Bureau of Equipment. The Admiral has been a strong advocate of a series of large coal depôts both at home and beyond the seas, and in his present report he shows not only what is being done toward the establishment of important stations at Honolulu, Pago-Pago, and at many points on our own coast, but urges that authority be at once given to improve the facilities at Cavite for handling coal and to provide adequate sheds. The growth of the Navy has within a year made it essential to have on hand at all times large coal supplies at various points in the Pacific, and at the present rate of progress in this direction, within a year the Navy will be able to secure fine grades of coal at Honolulu, possibly at Guam, at Pago-Pago, Cavite, San Juan, and Havana. Large sheds, with great capacities, and piers are building at Dry Tortugas, Key West, and elsewhere. Coal depôts, in other words, will soon be plentiful. One year ago there was but one outlying coal shed, and that at Honolulu, containing 1,000 tons. The enormous amount of fuel now necessary for the Navy and the amounts shipped abroad indicate that this part of a Service's supply will cost the Government immense sums: 281,169 tons of coal, at an average of $5.97 per ton, were purchased during the last fiscal year, as against 452,551 tons, at an average of $4.68 per ton, during the previous year. The average cost of coal at home during the year ending 30th June, 1898, was $4.02 per ton, as compared with $6.34 per ton the last year. This is because the coal last year was sent by hired transports: 55,789 tons of coal were shipped to Manila, 12,000 tons to Honolulu, 4,494 to Guantanamo, and 2,854 to Porto Rico, all American product. It costs nearly $9 a ton to ship this coal to Manila and Honolulu.

The Bureau has continued its experiments in testing coal with very satisfactory results; 123 reports from all commanding officers of vessels during the late war were practically all in favour of one particular kind of coal. The best coal is the cheapest. It is not alone a question of knots a ship can make per ton of coal; the preservation of boilers, freedom from spontaneous combustion, and the endurance of the fire-room force should all be considered in selecting the kind of coal to be used.

In consideration of the great cost of freight per ton to Manila, and the absence of American vessels as carriers, a contract was made with a reputable American shipmaster to man and victual the U.S. collier "Alexander" for the sum of $2,400 per month. The only Navy representative on board is a pay officer, who makes all the disbursements in connection with the usual expenses of merchant-ships.

Admiral Bradford devotes considerable space to an interesting discussion of the naval coaling station question, and recites the number of stations that were maintained in the Civil War, and the great necessity of maintaining important coal piles now. He recalls the consideration given the subject by Secretary Thompson and Secretary Hunt, and shows that Secretary Chandler years ago strongly urged the establishment of coaling stations. When the Spanish War began there was but one foreign coal depôt, that at Honolulu, where in a dilapidated building the Government housed about 1,000 tons. Unavailing efforts were then made to procure coal depôts in the West Indies. The only means, therefore, for supplying the fleet was by colliers, which kept every vessel well filled at all times. Admira Cervera had great difficulty in supplying his fleet with coal, because Spain was unable to reach her stations in Cuba. As Spain had landed possessions in the West Indies a United States fleet must, if called upon, he says, to act at any point across the Atlantic, encounter even greater difficulties than were found by Cervera. On this important question the report says:—

"At present it would be impossible for a United States fleet to carry on active operations during a war anywhere about the coast of Europe, Africa, a large portion of Asia, and South America, for want of coal.

"There is not a single port where coal or supplies may be obtained in time of war by a United States ship anywhere on the eastern or western coast of South America. In the West Indies and the Pacific Ocean we are now somewhat better off. It is of paramount importance, however, to establish a coal depôt on each side of the Isthmus of Panama, near the termini of the isthmian canal."

In treating of the general condition of coal depôts, the report shows that sheds have been erected at Honolulu with a capacity of 20,000 tons, and contracts have been let for two piers, which must be completed by next March, alongside of which the largest ships may lie and coal. At Pago-Pago, Samoa, work is progressing on a coaling station which is to house at least 5,000 tons of coal, with an iron pier and a railway running out, by which means war-ships may be readily supplied. When the necessary surveys have been made, it is proposed to establish at Guam another coaling station, with a capacity also of 10,000 tons. At present about 4,000 tons of coal a month are required at Manila for the Navy. The coal is stored in the open at Cavite, and is exposed to rain and sun, which cause rapid deterioration.

It is probable, under any circumstances, that coal will constantly be required at this port in the future, and it is recommended by the Bureau that the wharf and shed, as proposed by the Board, and approved by the Commander-in-Chief, be erected.

The Navy Department has a permanent lease from the Japanese Government of two lots at Yokohama, Japan, which constitute an admirable site for a coal depôt. It is desirable to establish a coaling station for the Navy at this port.

A coaling station should be established near the Yucatan Passage, the Windward Passage, Mona Passage, and Virgin Passage, all being important strategic locations.

Foreign coaling stations which do not carry with them sovereign rights are of little value, as during war the Government must rely upon its own resources.

At the beginning of the late war, with the exception of a shed at Key West, with a capacity for 3,000 tons, there were no accommodations at any of the navy yards or naval stations on our own coast for the receipt and storage of coal, or means for rapid handling of the same, in accordance with the best commercial practice of the day. The Navy had relied entirely upon coal dealers to supply coal to ships in the stream by means of lighters, as required.

The Bureau was much embarrassed during the war for means to satisfy the demands of commanding officers for rapid coaling, and it was frequently impossible to coal ships which were patrolling our coast, in a seasonable time. Merchant-ships are generally coaled alongside of their piers, while men-of-war are without such facilities.

Liberal appropriations were made during last Congress for remedying these defects. These appropriations have only been available since July, and in most cases but little progress has been made on the work. When completed, there will be facilities for storing and handling coal rapidly at the navy yard, Portsmouth, N.H. ; navy yard, Boston, Mass. ; naval station, New London, Conn. ; navy yard, New York ; navy yard, League Island, Pa. ; naval station, Port Royal, S.C., and navy yard, Pensacola, Fla.

Accommodations for the storage of 15,000 tons of coal, with coal-handling machinery, are nearing completion at Key West, with a capacity for about 20,000 tons, with convenient means for coaling.

It is recommended that Congress be asked to authorise retired officers to be placed in charge of naval coal depôts. Many of them, while not physically qualified to undergo the hardships and exposure incident to sea service, are qualified, Admiral Bradford thinks, for such duties.

Admiral Bradford regrets to note a growing tendency, apparently on the part of many officers, to employ pilots in entering harbours, and expresses the opinion that captains should be encouraged, and required, when practicable, to navigate their own ships. In one instance, a small auxiliary cruiser, formerly a yacht, employed a pilot on six consecutive visits to the port of Havana during the months of October and November, 1898. The port is very easy to enter or leave so far as the navigation of a ship is concerned. During the last fiscal year the Government paid out $31,000 in pilotage fees. The "Texas" and "Wilmington" lead.

Survey work under the Bureau is to be carried to a large extent. The coast lines of Cuba and Porto Rico are to be surveyed, and later also that of the Philippines. The work accomplished by the Hydrographic Office, the Nautical Almanac Office, the Naval Observatory, and other offices under the Bureau are given, but it is merely a recital of details.

The subject of electricity on ship-board comes in for much consideration, the general argument being for an extension of the system generally, rather than a reduction.—*Army and Navy Journal.*

MILITARY NOTES.

PRINCIPAL APPOINTMENTS AND PROMOTIONS FOR JULY, 1900.

Major-General and Hon. Lieut.-General Sir J. W. Cox, K.C.B., to be Colonel of the Prince Albert's (Somersetshire Light Infantry). Major-General and Hon. Lieut.-General W. C. Bancroft to be Colonel of the Bedfordshire Regiment. Lieut.-Colonel and Brevet Colonel T. C. Porter, from h.p. to be Officer commanding a Cavalry Brigade, South African Field Force, graded as a Colonel on the Staff. Colonel (Brigadier-General) Sir A. Gaselee, K.C.B., A.D.C., I.S.C., is granted the local rank of Lieut.-General whilst commanding the China Expeditionary Force. Colonel E. G. Barrow, C.B., I.S.C., is granted the local rank of Major-General whilst Chief Staff Officer of the China Expeditionary Force. Deputy-Surgeon-General H. Cayley, retired Indian Medical Service, to be Hon. Surgeon to the Queen. Lieut.-General Sir G. S. White, G.C.B., G.C.S.I., G.C.I.E., G.C.V.O., V.C., to be General on the Staff to command the Troops at Gibraltar, and to have the local rank of General whilst so employed. Colonel A. R. F. Dorward, C.B., D.S.O., Colonel on the Staff for R.E., commanding the Troops at Wei-hai-Wei, to be a Brigadier-General on the Staff to command the Troops in Northern China, and to have the local rank of Brigadier-General pending the arrival of Colonel (local Lieut.-General) Sir A. Gaselee, K.C.B., A.D.C., I.S.C. H.R.H. George Frederick Ernest Albert Duke of York, K.G., K.T., K.P., G.C.V.O., to be Colonel-in-Chief of the Royal Fusiliers (City of London Regiment). Lieut.-Colonel the Hon. W. P. Alexander, 2nd Dragoons, to be Colonel. Lieut.-Colonel C. Ward, Staff Paymaster, to be Chief Paymaster with the substantive rank of Colonel in the Army. Lieut.-Colonel W. R. Winter, A.S.C., to be Colonel. Lieut.-Colonel G. Stanley, A.S.C., to be Colonel. Lieut.-Colonel G. G. Monck-Mason, R.G.A., to be Colonel. Lieut.-Colonel (local Colonel) J. Willcocks, C.M.G., D.S.O., Commandant West African Frontier Force, in command of the Expedition to Ashanti, to be Colonel, in recognition of his services in connection with the relief of Coomassie. Colonel R. H. O'Grady Haly, C.B., D.S.O., retired pay, is granted the local rank of Major-General whilst commanding the Militia in the Dominion of Canada. Brevet Colonel (local Colonel) J. Willcocks, C.M.G., D.S.O., Commandant of the West African Frontier Force, to be a K.C.M.G. in recognition of his services while in command of the Expedition to Ashanti.

HOME. — I.— Estimate of the further amount required in the year ending 31st March, 1901, to meet additional expenditure mainly due to the war in South Africa and to affairs in China, £11,500,000. II.—Votes and sub-heads of the Army Estimates under which this Vote will be accounted for.

	£	£
Vote 1.—Pay, etc., of the Army.		
G.—Gratuities to Soldiers on Discharge ...	290,000	
H.—Gratuities to the Troops for Active Service	2,250,000	
Y.—Pay, etc., of Army Reserve	10,000	
AA.—Pay, and Allowances in the nature of Pay, of the Expeditionary Force for China	700,000	
		3,250,000
Vote 2.—Medical Establishment: Pay, etc.		
C.—Pay of Civilian Medical Practitioners, etc.	100,000	
D.—Corps Pay of Royal Army Medical Corps, Nurses, Clerks, and other subordinates	100,000	
E.—Cost of Medicines and Instruments ...	150,000	
		350,000
Vote 5.—Volunteer Corps: Pay and Allowances.		
D.—Camp Allowances	—	500,000
Vote 6.—Transport and Remounts.		
A.—Land and Coastwise Transport, United Kingdom	150,000	
B.—Land and Inland Water Transport, Colonies	150,000	
C.—Sea Transport	4,000,000	
D.—Purchase of Remounts	200,000	
		4,500,000
Vote 7.—Provisions, Forage, and other Supplies.		
A.—Cost of Provisions, and Allowances in lieu	150,000	
B.—Cost of Forage and Allowances in lieu, Paillasse, Straw, and Stable Allowance	200,000	
AA.—Supplies, etc., for the Expeditionary Force for China	500,000	
		850,000
Vote 8.—Clothing Establishments and Services.		
G.—Manufactured Articles of Clothing, etc., bought ready made...	—	100,000
Vote 9.—Warlike and other Stores.		
C.—Ammunition	50,000	
D.—Small Arms	50,000	
F.—Miscellaneous Services	50,000	
G.—Equipment Stores	100,000	
I.—Engineer Stores	250,000	
		500,000
Vote 10.—Works, Buildings, Repairs, etc.		
N.—New Works, etc., amounting to £1,000 each and upwards: Barracks	—	1,000,000
Vote 12.—Miscellaneous Effective Services.		
K.—Compensation for Losses	100,000	
L.—Medals	40,000	
		140,000
Vote 14.—Non-Effective Services, Officers.		
F.—Gratuities to Officers in lieu of Pensions	—	250,000
General Total ... ... £	—	11,500,000

The vote for new works and buildings is made up as follows, viz. :—

Hut accommodation for increased garrisons in various stations	£500,000	
Hut accommodation for increased garrisons in South Africa	500,000	
Barracks for British Battalion at Khartoum	50,000	
Hut accommodation for Native Infantry Regiment at Mauritius		
Hut accommodation for temporary increased garrison at Hong-Kong	10,000	
		1,060,000
Original Army estimate		64,809,153
Supplementary estimate now unrepresented		11,500,000
Makes a total of		£76,309,153
From this must be deducted appropriations in aid, viz.:		3,307,753
Leaving a grand total of...		£72,999,400

INDIA.—The following full particulars regarding the Expeditionary Force for China are now available. A division of all arms is being sent, and its composition is as under :—

Commander-in-Chief—Lieut.-General Sir A. Gaselee, K.C.B., A.D.C.

1st Infantry Brigade.—Brigadier-General Sir Norman R. Stewart.

7th Bengal Infantry (Fort William).
26th Bombay Infantry (Quetta).
1st Sikh Infantry (Kohat).
24th Punjab Infantry (Rawalpindi).
No. 1 Brigade Supply Column.
No. 39 Native Field Hospital (Jubbulpore).
No. 43 Native Field Hospital (Lucknow).

2nd Infantry Brigade.—Brigadier-General O'M. Creagh, V.C.

2nd Bengal Infantry (Dera Ismail Khan).
14th Sikhs (Nowshera).
1-4th Gurkha Rifles (Bakloh).
30th Bombay Infantry (Chaman).
No. 2 Brigade Supply Column.
No. 42 Native Field Hospital (Umballa).
No. 47 Native Field Hospital (Mhow).

Divisional Troops.

12th Battery Royal Field Artillery (Jullundur).
R-7 Ammunition Column Unit (Mooltan).
1st Bengal Lancers (Lucknow).
1st Madras Pioneers (Bangalore).
No. 4 Company Bengal Sappers and Miners (Roorkee).
No. 3 Company Madras Sappers and Miners (Bangalore).
No. 2 Company Bombay Sappers and Miners (Kirkee).
1 Photo-Litho Section Madras Sappers and Miners (Bangalore).
1 Printing Section Madras Sappers and Miners (Bangalore).
8 Special Signalling Units (British Infantry) (Calcutta).
No. 3 Brigade Supply Column.
Section B, No. 22 British Field Hospital (Calcutta).
No. 41 Native Field Hospital (Secunderabad).

Line of Communication Troops.

22nd Bombay Infantry (Mhow and Indore).
3rd Madras Infantry (Secunderabad).
1 Telegraph Section, Madras Sappers and Miners (Bangalore).
1 Railway Section (Calcutta).
1 Ordnance Field Park.
1 Engineer Field Park (Fort William).

Section A. No. 25 British Field Hospital (Madras). (As Base hospital for British officers and soldiers.)

No. 54 Native Field Hospital (Mian Mir).
No. 63 Native Field Hospital (Poona).
No. 66 Native Field Hospital (Bangalore).
No. 4 Field Medical Store Depôt (Calcutta).
1 Native General Hospital (400 beds) (Calcutta).
1 Native Military Base Depôt.
1 Base Supply Depôt.

Strength, Establishments, Baggage, and Tentage.—a. All units will proceed at Field Service strength and scale of establishments, relief scale of baggage, and Field Service scale of tentage. Officers will take all their uniform (except tunics and mess kit), and troops will take serge or cloth clothing in addition to Field Service kit. The relief scale of baggage will be as far as port of debarkation only.

b. The Native Infantry and Pioneer Battalions will be provided with full Field Service complement of 12 British officers.

Depôts.—Depôts will be formed as prescribed in the Field Service Equipment Tables. Native Infantry Depôts will be on Scale B.

Supply Battery.—The 57th Battery, Royal Field Artillery, will be the supplying battery of the 12th Battery, Royal Field Artillery.

Concentration and Embarkation.—a. The following units will be embarked at Bombay:—

Staff 2nd Infantry Brigade.
2nd Bengal Infantry.
14th Sikhs.
1-4th Gurkhas.
3rd Madras Infantry.
26th Bombay Infantry.
30th Bombay Infantry.
No. 2 Company Bombay Sappers and Miners.
No. 54 Native Field Hospital.
No. 63 Native Field Hospital.
No. 66 Native Field Hospital.

b. The remainder of the force will be embarked at Calcutta.

c. The Director of the Royal Indian Marine will arrange as expeditiously as possible for the necessary sea transport for conveyance of the force to China, all vessels to call at Hong-Kong for orders.

As far as possible, stores of one description will be loaded together, those which are likely to be first required being loaded last in each vessel.

Field hospitals will be embarked with units as under:—

With Field Battery	1 Section British Field Hospital.
With Native Cavalry Regiment ...	2 Sections Native Field Hospital.
With each battalion of Infantry ...	2 Sections Native Field Hospital.

The arms, ammunition, and equipment of each unit will accompany the unit in the same vessel or vessels, so as to be available at once on disembarkation.

The lieut.-generals commanding the forces concerned will make all necessary arrangements for rest-camps *en route*, and for the supply of ice for troops on the line of rail if considered necessary; and will sanction such reduction in the regulation number of troops allotted to each compartment as they may for climatic reasons consider desirable.

Ordnance.—All units and details will be armed with ·303 rifles or carbines, and will be supplied with the necessary proportion of appurtenances and component parts of these arms.

Ammunition.—1. Scale of small arm (·303) ammunition :—

—	On Soldier.	1st Regimental Reserve.	2nd Regimental Reserve.	Ordnance Reserve.	Total Number of Rounds per Man.
Artillery, per Carbine	—	—	—	—	20
Regiment of Native Cavalry ...	50	100	—	250	400
Native Infantry Battalion	100	80	120	450	750
Native Pioneer Battalion	60	120	120	450	750
Company of Sappers and Miners ...	50	100	—	250	400

In addition to above scale, small arm ammunition at the rate of 50 rounds per rifle or carbine will be furnished to all units for practice on voyage.

·303 Mark II. ammunition only will be taken.

2. Battery ammunition. 750 rounds per gun, which will include the usual proportion of case shot, or 4,500 rounds in all, including ammunition in battery, and ammunition column charge and ordnance reserve.

3. The Ordnance Field Park stores will be drawn from the Allahabad arsenal, supplemented as necessary from the Madras command. The *personnel* will also be drawn from Madras.

Machine Guns.—One ·303 Maxim gun on infantry field carriage and 30,000 rounds of ammunition will be issued to each battalion of infantry (except the two battalions detailed for the line of communication) and the Pioneer battalion at Calcutta.

Signallers.—The 8 special signalling units (British Infantry) will be detailed by the lieut.-generals commanding the forces, Bengal, Bombay, and Madras, 1 unit from Bengal, 3 units from Madras, and 4 units from Bombay.

Medical.—a. The Native General Hospital for 400 beds, complete with tents, will be equipped at Calcutta and despatched with the force under the orders of the principal medical officer, Her Majesty's forces in India.

b. Hospital-ship for the conveyance of sick from China to India will be taken up and equipped by the Director of the Royal Indian Marine in communication with the principal medical officer, Her Majesty's forces in India.

c. No transport except obligatory pack mule transport will accompany the field hospital.

d. Mosquito nets will be provided for the beds in field and general hospitals under the orders of the lieut.-generals commanding the forces, Bengal and Bombay.

e. 500 per cent. reserve of medical comforts will be taken and a sufficient reserve of medicines.

Post Office.—Postal arrangements will be made under the orders of the Director-General of Post Offices.

Telegraph.—a. A Telegraph Section from the Madras Sappers and Miners, consisting of 2 British non-commissioned officers, 2 Havildars, 2 Naiks, and 12 sappers, will accompany the force.

b. In addition to the above establishment, 20 military signallers (to be drawn : 10 from the Punjab and 10 from the Bengal command) will be attached to the section for duty.

Railways.—A Railway Section, consisting of 2 warrant or non-commissioned officers and 48 public followers, will accompany the force.

Surveyors.—4 native soldier surveyors, to be detailed by Army Headquarters, will accompany the force for duty with the Intelligence Staff.

Press Correspondents.—Officers belonging to the force will on no account be allowed to act as press correspondents. Applications for permission to accompany the force as press correspondents will be made to the Adjutant-General in India. Not more than one correspondent will be allowed for each newspaper. Officers appointed press correspondent must not be employed in any military capacity.

Concession and Privileges.—a. Staff officers, transport officers, special service officers, and others will draw the pay of their appointments from the date of their arrival at port of embarkation.

b. All ranks may be granted an advance of three months' pay.

c. The troops and followers of the force will be considered on field service for all concessions and privileges from the date of embarkation until they return to India.

d. Free passages to their homes may be granted to the families of all native followers.

e. Concessions which are admissible from or between certain dates will have effect from such dates.

f. The hospital and regimental (excluding Silladar) establishments will receive 50 per cent. batta. Commissariat-transport establishments will receive universal rates of pay and 50 per cent. batta.

g. The sanctioned followers paid by the troops will receive from Government such extra pay as may be necessary to put them on a par with the public followers of a similar class.

h. Followers of corps and departments, including clerks, commissariat agents, and others, will be allowed to make family allotments in accordance with paragraph 462, Army Regulations, India, Vol. 1., Part II.

Punjab Coolie Corps.

a. Two Punjab Coolie Corps will be raised at once under the orders of the Lieut.-General commanding the Forces, Punjab. The corps will be composed of Punjabi Mahomedan coolies recruited from men accustomed to carry loads and marching. Each corps will be organised as follows :—

1 Commandant (regimental officer).
1 Second-in-Command (regimental officer).
2 British Non-commissioned Officers (departmental).
20 Sirdars at 1 per 50 coolies.
40 Mates at 1 per 25 coolies.
2 Transport-Agents (2nd Class).
8 Sweepers.
1,000 Coolies.

b. The establishments will receive clothing as laid down in paragraph 20.

c. Equipment.—Four yards of coarse country cloth should be provided to each coolie to secure the load on the back. Daos or kukries for arming the men should be arranged for if considered necessary at the scale of one per follower and taken in bulk with the corps.—*The Pioneer Mail.*

SOUTH AFRICA.—The field artillery of the Boers consists for the most part of Creusot 3-inch rapid-fire guns made after the 1895 model. These guns were purchased by the South African Republic during the year 1896, after

most satisfactory trials had been made under the direction of a committee consisting of artillery officers, who were sent to Creusot by the French Government at the request of that of the Transvaal. The *data* that follow are taken from the official documents which were published in the *Revue d'Artillerie* of March, 1897, after the termination of the experiments.

The gun, which is constructed of forged and tempered steel, has a 3-inch bore. Its total length is 8 feet and its weight is 726 lbs. The body of the gun consists of three elements:—1. A tube in which the breech piece is fixed. 2. A sleeve covering the tube for a length of 3·6 feet. 3. A chase hoop. The chamber is provided with 24 grooves of variable pitch, which have a final inclination of 8°.

The system of breech closing is that of the interrupted screw, which presents four sectors, two of them threaded and two plain, so that the breech is opened or closed by a quarter revolution of the screw. The mechanism is of the Schneider system, patented in 1895, and has the advantage of allowing the opening or closing of the breech to be effected by the simple motion of a lever from right to left, or *vice versâ*.

The gun is fired by means of an automatically cocked percussion apparatus. A safety device prevents any shots from being fired until after the breech is closed.

The carriage is provided with an hydraulic recoil cylinder fitted with a spring return. It is also furnished with a "spade," which is placed under the stock at an equal distance from the trail and the axle, and which is of the model that General Engelhardt has adopted for the Russian artillery.

During a march, this spade is turned back and fastened to the stock. The carriage is likewise provided with a road brake, which is to be employed in firing only when the nature of the ground is such that the spade cannot be used.

The gun is placed in a bronze sleeve that carries the brake cylinders and the various other connecting pieces for the return spring and the aiming apparatus.

The hydraulic recoil consists of two cylinders placed laterally and at the height of the axis of the piece.

The axle has the peculiarity that in its centre there is a wide opening in which are placed the cradle and the gun. It is provided with two screw trunnions, around which the pivoting necessary for lateral aiming is effected. This arrangement of the gun with respect to the axle has the effect of greatly diminishing the shocks that firing tends to produce.

Elevation and depression are accomplished by rotating the axle in the wheels of the carriage. This is done by means of a crank which, through an endless screw and pinion, controls a toothed sector attached to the sleeve.

Pointing in direction is done by means of a lever known as a tail piece. Mounted upon the axle there are two small sights forming a line of aim, that permit of bringing the carriage back in the direction of the target as soon as a shot has been fired. All that the gunner has to do is to give the piece a slight displacement laterally with respect to the carriage by means of a hand wheel, which turns the gun 2° to one side or the other.

The line of aim is found by a back and front sight arranged upon the right side of the sleeve in which the gun is mounted. The back side permits of aiming while the gun is being loaded. It carries a small oscillating level that indicates the elevation of the gun during rapid firing.

The weight of the carriage, without wheels, is 1,146 lbs., and, with wheels, 1,477 lbs.

The ammunition consists of cartridges containing charge and projectile and having a total weight of 19 lbs. The powder employed is of the smokeless kind, designated by the letters B.N. The weight of the charge is 1¾ lbs. The projectiles are of three kinds: ordinary shells, shrapnel shells, and case shot. The weight of each is the same, say 14¼ lbs. The shrapnel shells contain 234 balls, weighing 155·8 grains each, and an explosive charge of 3·13 ozs.

As the gun can be pointed at a maximum angle of 20°, and the initial velocity is 1,837 feet, the projectiles can be fired to a distance of 26,248 feet.

The crew necessary to serve the gun consists of six men—a gunner, a man to manœuvre the breech piece, a man to manœuvre the pointing lever, two men to pass the ammunition, and a man to regulate the fuse. The rapidity of firing can easily be raised to ten shots a minute.

The accuracy of the gun is most remarkable. Upon the occasion of the trials made when the guns were received, the following firing was done: a regulating shot, a first volley of six shots in 42 seconds, and a second volley of six shots in 46 seconds.

The fore carriage of the gun and that of the caisson are identical. They carry a chest containing 36 cartridges, and are capable of accommodating four men.

The back carriage of the caisson carries two chests like that of the fore carriage.

The total weight of the gun and fore carriage loaded is 3,790 lbs., and that of the caisson 4,330 lbs.—For the above particulars and the illustrations we are indebted to *La Nature.—Scientific American.*

AUSTRIA-HUNGARY.—Government civilian *employés* of the Austro-Hungarian Empire have for some time been in the enjoyment of a higher rate of emolument, says the Berlin *Militär-Wochenblatt*, whilst officers have continued to be less well paid than the civilian *employés* of corresponding rank. To properly understand this, it must be remembered that the various civil employments are divided into a certain number of classes, and that each of these classes correspond to a certain military rank.

The position of officers is about to be improved, but at the same time the improvement does not come up to what had been anticipated, and some military journals of the Austro-Hungarian press, amongst others the *Vedette*, lay stress on this disparity to the disadvantage of the Army.

However that may be, the following are the new rates of pay to commence on the 1st January of the present year, with retrospective effect. A crown amounts to 10d. in English money.

1st Class	Field-Marshal	...	...	...	24,000 crowns a year.	
2nd Class, does not exist in the Army.						
3rd	,,	General of Cavalry	...	...	16,800	,, ,,
4th	,,	Lieut.-General	...	...	14,016	,, ,,
5th	,,	Major-General	...	...	11,400	,, ,,
6th	,,	Colonel	...	...	7,200	,, ,,
7th	,,	Lieut.-Colonel	...	...	6,000	,, ,,
8th	,,	Major	...	...	4,008	,, ,,
9th	,,	1st Class Captain	...	...	3,000	,, ,,
,,	,,	2nd ,, ,,	...	...	2,400	,, ,,
10th	,,	1st Lieutenant	...	...	2,004	,, ,,
11th	,,	Lieutenant	...	...	1,680	,, ,,

To these amounts are added lodging and stabling allowances, forage, etc., which are calculated in the following manner.

For lodging and stabling allowances all the garrisons are divided into 10 classes; in addition, Vienna and Buda-Pesth must be taken into consideration, where the allowances are higher than in all the other garrisons; this gives a total of 12 classes into which the garrisons are divided.

In Vienna the allowances for officers belonging to the 1st Class amount annually to 6,688 crowns, and for those of the 11th Class to 880 crowns. In garrisons where the allowances are less high, they vary from 2,800 crowns for officers of the 1st, to 136 crowns to officers of the 11th Class.

In addition, every officer up to and including the rank of major receives, everywhere, an allowance for furniture, which amounts to 168 crowns yearly for a

major, 120 for a captain, and 104 for a 1st lieutenant and for a lieutenant. The stabling allowance is a yearly one and calculated by the number of chargers of each officer, and amounts to 320 crowns at Vienna, and to 40 crowns in garrisons where the rate is smaller.

Forage is distributed as follows:—

Field-Marshal and General of Cavalry	7
Colonel	3
1st Class Infantry Captain	1
1st ,, Cavalry Captain	3

All these officers mount themselves. 1st lieutenants and lieutenants are mounted at State expense. Officers up to and including the rank of colonel are provided with an orderly; if they cannot be so provided, they receive a monthly allowance of 16 crowns. Officers of higher rank are provided with orderlies, but must feed and keep them. Every officer newly appointed receives an advance for equipment amounting to 500 crowns in the hussars, 400 in the dragoons and uhlans, 320 in the artillery and military train, 240 in other branches of the Service. In future on each appointment the State will retain a third of the difference in pay between the former rank and the present one.

The rate of pensions was also increased at the same time that the higher rate of pay was brought in. Lieutenants of the 11th Class will in future receive a minimum pension of 600 crowns, and a maximum one of 2,040 crowns after 40 years' service.

CHINA.—The following is a *résumé* of an article which recently appeared in the *Russkii Invalid* on the Chinese Army, written by an officer of the Russian General Staff.

The military organisation of China is utterly different to that of European nations. Without doubt, the extraordinary and complicated grouping of the Celestial Military Forces are due to historical and geographical factors, and to the great differences that exist both on political and religious grounds between the various peoples of that immense Empire. The Chinese Army may be divided into three great portions, viz.:—

1. The Old Armies.
2. The New Armies.
3. The Mongolian and Thibetean Militias.

It should be added that in the event of absolute necessity the Government has the right to decree the raising of Militia in all the provinces.

1. *The Old Armies* consist of:—
   - *a.* The Imperial or Banner troops (Manchus or troops of the eight Banners). They serve to keep Manchu dynasty, foreign to the population, on the throne. This dynasty has reigned since 1664.
   - *b.* The provincial troops (green flags). Their duties are to preserve order and tranquillity in the interior.

2. *The New Armies* are composed of corps of comparatively recent formation, and were specially raised on account of the recent wars of China against foreigners (Europeans and Japanese).

3. *The Mongolian and Thibetean Militias* do not exist in peace-time, except on paper.

There is no general system of organisation common to these different armies. Each has its own rules and customs. It may be as well, however, to look with some detail into the Chinese military forces, with special reference, on account of the present campaign, to the Pekin troops and those of the province of Chi-Li.

I.—THE OLD ARMIES.

A.—The Army of the Eight Banners.

These troops were originally recruited from amongst the conquerors of China (the Manchus), to which Chinese and Mongolian contingents have been added

from time to time. Commands and military employments are hereditary in this army. Each of the three nationalities represented in this force form a separate group of 8 units (banners), viz., 24 in all (8 Manchu, 8 Chinese, and 8 Mongolian). The colours of the banners are :—

1st unit—yellow.
2nd ,, —white.
3rd ,, —blue.
4th ,, —red.
5th ,, —yellow with red border.
6th ,, —white with blue border.
7th ,, —red with yellow border.
8th ,, —blue with white border.

The troops of the 8 banners and their families are at present divided into three armies, viz. :—

a. The Pekin Army.
b. The provincial armies.
c. The armies of the 3 Manchu provinces.

a. The Pekin Army.—These troops and their families are quartered in Pekin and its neighbourhood. They form a considerable portion of the population of the capital.

Each Manchu and Chinese banner consists of 5 regiments, and each Mongolian of 2, viz. :—

40 Manchu regiments.
40 Chinese ,,
16 Mongolian regiments.

Total, 96 regiments.

These regiments are sub-divided into companies of from 90 to 300 men, but this division into regiments and companies is purely administrative, and has no military significance. The army of the 8 Banners consists at Pekin of a total effective strength of 127,246 men, but deducting those used for police purposes, guardians of tombs, etc., the real strength is reduced to 56,357 soldiers.

b. Provincial Armies.—These are divided into 30 or 40 garrisons, and may be estimated at about 41,834 men.

c. Armies of the 3 Manchu Provinces.—Each of these provinces has its own army, making a total of 36,875 men.

Other garrisons of the northern frontier consist of 4,875 men.

Thus the troops of the 8 Banners in the whole of the Chinese Empire have an effective of 210,830 men.

B.—Green Flags.

These consist of Chinese Volunteers enlisted for varying periods of service. Officers obtain their rank as the result of an examination. They are, in fact, territorial units which are under the orders of the governors of provinces. They are used for garrison duty in provincial towns to provide escorts for convoys (generally prisoners), for police duty, to protect the lines of communication, etc. They are divided into military and naval forces, and are liable to service on rivers. Their value varies according to their religion. Those of Chi-Li are the best. The total number of the Green Flag Army may be reckoned at 475,177 men.

II.—The New Armies

Consist of: 1st, enrolled or conscript armies (irregulars). Strength, 98,161 men. They are raised at the initiative of the viceroys and governors of provinces in the event of revolution or of war with Europeans. 2nd, the Active Armies. They are dressed like Europeans, and are formed by the help of the best men drawn from the Green Flag Army. Strength, 210,737 men. These troops occupy important strategic points, and are employed on operations in open country. They are under the orders of the provincial authorities. The best are

those of the province of Chi-Li, thanks to the efforts of Li Hung Chang. Special mention should be made of the troops of Nieh, 1,500 men, those of You-Chi-Kaï, 17,000 men, the *troops of the new frontier*, 24,749 men, and of the *troops for the defence of* Manchuria, 13,500 men.

These latter troops, recruited from the native population, were raised in 1885. They are concentrated at Moukden, Kirin, and Tsitsillar. They are divided into three divisions, each division consisting of:—

8 infantry battalions of 500 men each.
2 cavalry regiments of 250 men each.
20 modern guns.
Total, 13,500 men and 60 guns.

The reserve of this army consists of 35,000 men.

III.—Militias.

Mongolian Militia.—117,823 men on a war footing, but in reality this armed force only exists on paper. In peace-time only a few units are organised for guarding roads and telegraphs.

Thibetean Militia.—640,000 men in war, 3,000 in peace-time, divided into 6 units.

Armament.—These troops have various arms, such as bows and arrows, spears, pikes, axes, matchlocks, etc.; but they also have modern Q.F. and magazine rifles (Mauser, Remington, Enfield, Winchester, Martini-Henry, Martini-Peabody). The number of these modern rifles is estimated at 500,000. The field artillery has guns of 40, 50, 60, 75, 80, and 90 millimetres of the Krupp system, Nordenfeldt, Hotchkiss, etc., and Gatling machine guns. Garrison and coast artillery are provided with guns of 40, 60, 75, 80, 90, 120, 150, 170, 210, 240, and 280 millimetres. These guns come from the Krupp or Armstrong works.

The Chi-Li Army.

The seizure of Kiao-Chiou, Port Arthur, and Wei-hai-Wei by the Europeans, the numerous territories and railways that the Celestials had to cede to foreigners, the strengthening of European forces in the Far East, latterly obliged the Chinese Government to recognise its own weakness and to study means to remedy it. It resolved, therefore, to form a proper army capable of preserving the integrity of the Empire. The army of Chi-Li was in consequence re-organised by the Chancellor Yun-lu, with the help of Lu-Chang, who had lived for some time in Germany.

The following is the summary of the re-organisation proposed by Lu-Chang:—

All the troops of Chi-Li, with the exception of the Army of the 8 Banners, are under the sole command of the Chancellor Yun-lu, and form an army thus constituted:—

A.—One army corps of five divisions. General staff at Pekin. Each division includes troops of all arms, but these divisions appear each to have its *rôle* laid down in advance.

1st Division (*the Advanced Guard*).

Infantry	8,000 rifles
Cavalry	1,000 sabres
Artillery	64 guns

2nd Division (*Rear Guard*).

Infantry	5,448 rifles
Cavalry	2,000 sabres
Artillery	?

3rd Division (Right Wing).

Infantry	5,190 rifles
Cavalry	492 sabres
Artillery	60 guns

4th Division (Left Wing).

Infantry	4,784 rifles
Cavalry	3,520 sabres
Artillery	64 guns

5th Division (Centre).

Infantry	4,800 rifles
Cavalry	1,600 sabres
Artillery	48 guns

B.—A 6th Division under General Nieh. Staff at Lu-tai.

Infantry	6,400 rifles
Cavalry	400 sabres
Artillery	32 guns

C.—A 7th Division under General Nieh. Staff at Lu-tai.

Infantry	4,800 rifles
Cavalry	4,200 sabres

The total forces of Chi-Li thus organised, not including 56,357 soldiers of the army of 8 banners, consist of:—

Infantry	39,822 rifles
Cavalry	12,942 sabres
Artillery	268 guns

Making a total of more than 60,000 combatants.—*Précis* from *Revue du Cercle Militaire.*

FRANCE.—The following is the composition of the French Expeditionary Force for China, as detailed by M. de Lanessan:—

Commander-in-Chief—General Voyron.

1st Brigade—General Frey.

16th Marine Infantry Regiment, 3 battalions of 600 men each.
17th ,, ,, ,, ,, ,, ,,
18th ,, ,, ,, ,, ,, ,,
4 Mountain Batteries of 80-millimetre guns } 800 men, 720 mules.
2 Field ,, ,, ,, }
A section of artillery artificers (50 men).
A telegraph section (50 men).
A hospital orderlies section (50 men).

A section of engineers of 50 men, formed from the marine artillery, which will be broken up on the arrival of the engineers detailed for the war.

The 16th Regiment, 2 mountain and 1 field batteries of 80-millimetre guns are already at Taku. The 17th Regiment and the two other mountain batteries of 80-millimetre guns left France on the 1st and 3rd July by the "Nive," the "Cachar," and the "Columbo." The 1st Battalion of the 18th Regiment, as well as artificers, telegraphists' sections, etc., left France on the 12th July by the "Vinh-Lonh," the two other battalions of the 18th Regiment embarked on the 18th and 19th July on the "Sinaï" and "Tigre"; finally, the last field battery of 80-millimetre guns will leave Toulon on the 1st August by freight ship.

The strength of the marine infantry battalions will later be raised from 600 to 800 men.

2nd Brigade—General Baillond.

A regiment of Zouaves (4 battalions of 1,000 men each).
A regiment of infantry (3 battalions of 1,000 men each).
A group of 3 batteries of 75-millimetre guns, 550 men, 518 mules.
2 companies of engineers (500 men, 95 mules).
2 squadrons of Chasseurs d'Afrique (300 men, 300 horses).
A section of artillery park (130 men).
An engineers' divisional park (40 men).
Detachments of administration troops and military transport for the different services of an independent division (800 men).

The troops of the 2nd Brigade will probably leave from the 10th to the 20th August, partly from France and partly from Algiers.

The question regarding the despatch of a battery of 120 *court*, 2 companies of military transport, a railway and a balloon section are still under consideration.

Ammunition.

Men of the two infantry brigades have 120 cartridges; the batteries of marine artillery are provided with 900 rounds. A further reserve of 500 rifles and 2,500 rounds for 80-millimetre guns, and 1,000,000 cartridges were sent by the "Nive" and the "Vinh-Long." A reserve complement of 500 cartridges per rifle, and 500 rounds per gun, will be always kept up, and will be distributed until further orders partly at Saïgon and partly at the base of operations.

Maps.

The Topographic Department of the Expeditionary Force, in addition to the maps already provided, will receive shortly, at Taku, 500 specimens of the map of the Pechili district, published by the Japanese Staff.

Coolies.

In order to minimise, as far as possible, fatigue to the troops, 10 Anamite coolies per company or battery, carefully selected by the Commander-in-Chief of Indo-China, will be shipped at Saïgon. If these are unable to stand the cold climate, they must be replaced by Japanese or by Chinese from Fan-Kien or Formosa.

Clothing and Equipment.

All men of the 1st Brigade have colonial clothing, arms, equipment, and camp equipment, including the *tente d'abri;* they will take, besides, their cloth trousers. Each man will be provided with a mosquito net and a waterproof sheet 2 metres long by 1·20 metres wide. A permanganate of potash filter will be given to each half section.

The men of the 2nd Brigade will be provided with all necessaries for a field kit, including the *tente d'abri.* On account of the want of special clothing for crossing the Red Sea, they will have cotton jumpers and trousers issued to them. They will be provided individually with a waterproof sheet, and with a filter to every half section. It will not be necessary to issue mosquito nets, on account of the time of the year the men will arrive in China, viz., the end of September.

An order for 15,000 khâki garments has been sent to Saïgon, in order that the men of the Expeditionary Force may be suitably and uniformly clothed.

The dress for the cold season will be similar to that worn in winter in France. Every man will receive in addition 1 woollen knitted vest, 1 pair of drawers, 2 pairs of woollen socks, 1 large pair of gloves, an Alpine Chasseur's cap and leggings, and a large woollen wrap in addition to the usual camp covering.

Five hundred large colonial tents for 16 men will be sent to Taku, to be used for stationary camps and to shelter men not taking part in flying columns.

Transport.

Animals sent from France are not likely to live long in China, and will, besides, be greatly tried by the long sea voyage. It has therefore been decided

to reduce their numbers as far as possible by limiting them to those necessary to mount the two cavalry squadrons, horse the batteries, and to transport the engineer *matériel.* In addition to these, there must be about 100 saddle horses or mules and 250 draught mules to each brigade, to carry tools, medical stores, ammunition, and baggage. The transport of two days' rations, which are indispensable, will require besides 180 draught mules per brigade, if transport by junks, wagons, or coolies is not obtainable. The transport for the engineer divisional park must also be provided for, as well as the infantry and artillery ammunition sections, sanitary impedimenta, possibly ballooning *matériel*, and, finally, administration convoys.

To meet all these requirements the Minister for Foreign Affairs has been requested to purchase 3,000 horses or mules in Corea, and a remount service has been organised for the purchase of animals in China and at Tonkin. Orders have been issued for the purchase of 450 Lefèvre carriages, which should render good service in the flat country in Northern China.

Administrative Services.

The *personnel* of these services for the 1st Brigade will be furnished by the Navy, and that of the 2nd Brigade by the War Department. But all the revictualling of the Expeditionary Force will be under the entire control of the Navy, the chief commissariat officer sending in the necessary proposals and requisitions to ensure the proper carrying out of this important service—200,000 rations have already been sent to Taku on the 1st July, 350,000 on the 12th July, and 400,000 on the 19th July. Steps will be taken that by September next there will be a reserve of six months' provisions, about 2,700,000 rations, established at the base of operations. Ten field bakeries per brigade will be provided for making bread. Although there is a large reserve of preserved meat, it is recommended that use should preferably be made of animals on the spot, fresh meat being better for the health of the troops. A large reserve will also be formed at the base of operations, consisting of clothing, large and small articles of equipment, tobacco, skates, and roughed shoeing for ice traffic, for harness and draught animals.

The chief commissariat officers are especially recommended to take steps to procure firing for the winter months, as the number of troops of the different European nations will soon exhaust local resources.

Medical Service.

That of the 1st Brigade will be under the Navy, and that of the 2nd Brigade under the War Department. Besides the two doctors belonging to each battalion, each brigade will have a divisional ambulance and field hospitals. The "Nive" will be used as a hospital-ship, and other ships will be used for the transport of the sick and wounded.—*Précis* from *Le Progrès Militaire.*

GERMANY.—The following is the composition of the German Expeditionary Force for China, as given by the *Militär-Wochenblatt*:—

Commander-in-Chief—Lieut.-General von Lessel.

1st East Asiatic Infantry Brigade.—Major-General von Gross, General von Schwartzkoff.

Place of formation, Berlin (3rd Guards Infantry Brigade).

1st East Asiatic Regiment (1st and 2nd Battalions Guards Fusilier Regiment with 4 doctors).

2nd East Asiatic Regiment (2nd Regiment of Foot Guards with four doctors).

2nd East Asiatic Infantry Brigade—Major-General von Kettler.

Place of formation, Berlin (2nd Guards Infantry Brigade).

3rd East Asiatic Infantry Regiment (3rd Regiment of Foot Guards with 4 doctors).

4th East Asiatic Infantry Regiment (4th Regiment of Foot Guards with 4 doctors).

All these regiments consist of 2 battalions of 4 companies each.

CAVALRY.

Place of formation, Potsdam.

East Asiatic Cavalry Regiment (1st Uhlan Guard Regiment).

ARTILLERY.

Place of formation, Jüterbog.

East Asiatic Field Artillery Regiment, 4 batteries, with 4 doctors.
A light Ammunition Column.
A half Field Howitzer Ammunition Column.
A Battery of heavy Field Artillery (howitzers).

In addition to the above, the following will accompany the force:—
An East Asiatic Pioneer Battalion, formed at Harburg (with 2 doctors).
A Telegraph Section, formed at Berlin (with 1 doctor).
A Railway Company ,, ,, (with 1 doctor).
An Army Medical Company, formed at Flensburg (with 8 doctors).
An Ammunition Column Section, formed at Jüterbog (with 2 doctors). It consists of an infantry ammunition column, a field artillery, and field howitzer, and a heavy field artillery ammunition column.
The Military Transport, formed at Spandau, consists of 2 provision columns, 1 field bakery column, and 4 field hospitals, 3 with 6, and 1 with 5 doctors.
Station Commands, formed at Berlin.
Horse Depôt, formed at Posen.
Personnel of Field Hospital, formed at Alt-Damm (consisting of 19 military doctors).
Clothing Depôt, formed at Berlin.
Personnel of the Control of Military Train, formed at Karlsruhe.
The hospital-ship of the Expeditionary Force will be under the direction of 10 military doctors of various rank.

The sums allowed for drills and musketry to be carried out on broken ground and in the camps of instruction have been fixed as follows:—

The Guard Corps	£4,250
Ist Army Corps...	4,650
IInd ,, ,, ...	3,750
IIIrd ,, ,, ...	3,350
VIth and XVIth Army Corps	4,750
VIIth and VIIIth ,, ,, ...	6,000
IXth Army Corps	4,450
Xth and XIth Army Corps	3,550
XIVth and XVth ,, ,, ...	5,250
XVIIth Army Corps	4,050
XVIIIth ,, ,, ...	3,800
General Inspection of Cavalry	50
,, ,, ,, Foot Artillery	150
,, ,, ,, Military Education	90
Inspection of Jaegers and Schützen	4,000
,, of Infantry Schools	750

These funds are at the disposal of army corps commanders, and whatever remains over from them for one year may be brought forward to the next. According to instructions, allowances from these funds may be given to:—

1. An officer detailed, on duty, for a reconnaissance ride ; this ride not to exceed two days.
2. Officers detached to another garrison to give or to follow a course of instruction in equitation. These latter allowances are fixed as follows—*viz.* : to captains 4s., to lieutenants and sub-lieutenants 3s. Officers on rejoining their own garrison after such a course are refunded their travelling expenses.

It is strictly forbidden to expend any of these funds on the following, viz. :—

1. On manœuvres or drills for which there are already funds set apart in the Budget, such as Autumn Manœuvres, attack and besieging of fortified places, cavalry instruction rides, musketry schools, and field artillery gunnery practice, technical drills for foot artillery, pioneers, etc., as well as for drills which may be carried out on the garrison drill grounds.
2. For the cost of inspection journeys.
3. For the hiring of land with a view to increasing the area of the manœuvre ground.
4. For the making of targets or for the purchase of ball ammunition.

—*Bulletin de la Presse et de la Bibliographie Militaires.*

RUSSIA.- During 1899 the Russian Army underwent several changes in its organisation, especially as regards the troops in the Caucasus, Turkestan, and Eastern Asia.

In the Caucasus and in Turkestan the existing military forces were re-grouped without being numerically increased ; in Siberia, on the other hand, they were largely augmented and the reserves entirely renumbered.

Up to quite lately there had only been one single organised army corps in the Caucasus. This corps consisted of :—

a. 3 Infantry Divisions.
b. 2 Divisions of Cossacks of the Caucasus.
c. The Artillery attached to these Divisions.

The other troops quartered in the Caucasus did not belong to this army corps, amongst others the 21st Infantry division and its divisional artillery, the Caucasian rifle and sharpshooters brigades as well as their artillery, and the Caucasian cavalry division. All these troops are now grouped into two army corps, as follows :—

1st Army Corps.—2 Infantry divisions, 2 divisions of Caucasian Cossacks, the artillery belonging to these divisions.

2nd Army Corps.—2 Infantry divisions, 2 Caucasian rifle and sharpshooters brigades, the Caucasian cavalry division, the Daghestan cavalry regiment, the two sotnias of Osschin horsemen, the artillery belonging to these formations.

These mobile army corps, nevertheless, do not include all the garrisons of the Caucasus, there still remain, outside this grouping, local and fortress troops, as well as the reserve units. A similar division of the forces into two army corps has taken place in the Turkestan military district, which now includes the Trans-Caspian, Syr-Daria, Fergana, Samarkand, Semirietschensk provinces, and the Amou-Daria department.

For instruction purposes, and chiefly with regard to the combined action of the Caucasian and Turkestan troops, one cannot lay too great stress on this new grouping, especially when one considers that the Caucasian troops may act as a reserve to those of Turkestan, and that a fully organised and equipped army corps, taken from the former of these two districts, may easily reinforce the troops of the latter.

One knows that in Russia there exist in peace-time, units called "reserve," which are utilised to prepare the formation of those new and stronger units to be raised in the event of mobilisation. In the infantry these reserve units consist of battalions, regiments, and brigades. By an order of the 7th June these infantry reserve brigades were renumbered. Following immediately on the 45th active infantry division, the 1st reserve brigade took the number 46, the last one being numbered 66, so that there are thus 21 reserve infantry brigades.

The brigades numbered from 46 to 50 (with the exception of the 49th, which is not yet formed), and the 65th and 66th (Caucasian) consist of 4 regiments of 2 battalions each, those numbered from 51 to 64 only consist of 4 battalions of 5 companies each. All these brigades, those which have only 4 battalions as well as those consisting of 4 regiments, each form on mobilisation a reserve division of the 1st line, with the same number as the original brigade, in the following manner; in the latter case the reserve regiments of 2 battalions are doubled; in the former case the 4 first companies of each reserve battalion form 4 battalions. The 5th companies remain available to form a nucleus of new reserve divisions of the 2nd line, which would be numbered from 67 to 80.

The divisions of the new formations should have the same composition as the active divisions, viz. :—2 infantry brigades of 2 regiments of 4 battalions, 1 Cossack sotnia, divisional artillery, consisting of 6 batteries for divisions of the 1st, and 4 batteries for divisions of the 2nd line, 1 company of engineers, supply and transport sections.

As regards the artillery, the cadres of the new formations would be provided by the 7 reserve units, and by an independent reserve battery. Those of the engineers would be taken from the two engineer reserve battalions. The rank and file necessary for the new formations are drawn from the reserve. The full complement of clothing, equipment, arms, etc., exist during peace-time for these reserve formations.

In addition to the troops of the infantry reserve who are brigaded, there are also 15 independent battalions, which are distributed as follows, viz. :—1 in each of the military districts of St. Petersburg and of Kazan, 2 in the Caucasus, 2 in Turkestan, 2 in the Amour military district, and 7 in the Siberian military district.

By a decree of 30th October, a complementary cadre, consisting of 3 captains, 4 lieutenants, 12 non-commissioned officers, and 28 lance-corporals, must be formed in these 7 battalions. At the time of mobilisation each of these 7 battalions should form a regiment of 5 battalions, and the complementary cadre a depôt battalion. The depôt battalion is meant for local duty and for the instruction of the men. The two reserve battalions stationed in the Amour military district each form, in time of war, a regiment of 4 battalions, and 1 independent battalion.

The same order prescribes that a second infantry fortress regiment of 3 battalions should be raised at Vladivostok, which makes 2 infantry fortress regiments of 3 battalions quartered in this place. The 5 battalions of the 2nd East Siberian Brigade are each transformed into a regiment of 2 battalions. This brigade is stationed in the Amour military district, chiefly on the coasts; two battalions (now regiments) are at Vladivostok.

One company cadre of the military train of the south of the Oussouri has also been organised at Nikolsk-Oussouriski. It will form a military transport battalion on mobilisation. Two battalions of fortress artillery were formed at Port Arthur on the 20th March, and a group of Siberian artillery, consisting of 2 light batteries of 4 guns, was organised on the 27th September. In the event of war, this group will form 4 groups also of 2 batteries each.

Finally, it should also be mentioned that, by an order of the 11th October, the cadre of the officers of the fortress sapper-miner companies at Vladivostok, the Amour, and Novokievskoïe have been placed upon a war footing.

In consequence of all these changes, the situation of the Russian military forces in Eastern Asia at the end of 1899 was as follows :—

The Siberian Military District.

1st West Siberian Line Battalion.
3rd West Siberian Cossack Regiment.
The local Omsk and Irkoutsk Brigade.
7 reserve battalions, forming on mobilisation 7 regiments of 6 battalions, one being a depôt.
The Siberian Reserve Artillery group (2 batteries) ; in war-time, 4 groups (8 batteries).

The Amour Military District.

Brigaded Troops.

2 East Siberian Rifle Brigades, each of 4 regiments of 2 battalions.
1st East Siberian Brigade of 4 battalions.
2nd East Siberian Brigade, 5 regiments of 2 battalions.
The Oussouri Cavalry Brigade (regiment of Primorski Dragoons, 1st Regiment of Trans-Baïkal Cossacks from Tschita, Oussouri Cossack sotnia).
1st East Siberian Artillery Brigade (8 batteries).
2nd East Siberian Artillery Brigade (4 batteries).
2 East Siberian Artillery Parks.

Unbrigaded Troops.

2nd and 4th East Siberian Line Battalions.
Striétensk Reserve Battalion, Tschita Reserve Battalion (forming, in case of war, 2 regiments of 4 battalions and an independent battalion).
Group of Trans-Baïkal Artillery (2 batteries).
East Siberian Engineer Battalion.
Company Cadres of Military Train, forming a battalion in war-time.
1st Oussouri Railway Battalion.
Cossack troops (additional to those mentioned above).
1st Nertschinski Cavalry Regiment.
1st Trans-Baïkal Cavalry Regiment.
1st Cossack Battery.
2nd Cossack Battery.
Regiment of Amour Cossacks.

Fortress Troops (at Vladivostok).

1st and 2nd Infantry Fortress Regiments of three battalions each.
1 Company of Fortress Artillery.
2 Companies of Fortress Sappers and Miners.
1 Company of Engineers.
1 Telegraph Detachment.

(At Novokievskoïe).

1 Company of Fortress Sappers and Miners.
A Detachment of Fortress Artillery.

(At Nicolaïevsk).

A Company of Fortress Artillery.

The territory of Kwantum, which forms the southern point of the isthmus of Liaou-Toung, where Port Arthur is situated, was, as one knows, leased to Russia

by China for 25 years by a contract dated 27th March, 1898. This territory was formerly attached to the Amour Military District. It was constituted into an independent government, under the direct orders of the Minister of War, by a Ukase of the 28th August, 1899. The troops stationed there are:—

3rd East Siberian Rifle Brigade of 4 regiments of 2 battalions.
The Artillery of this Brigade (3 batteries).
An Engineer Company, with Telegraph Detachment.
The Werchuz-Oudinski Cossack Cavalry Regiment.
2 Battalions of Fortress Artillery of 3 companies each.

According to the *Rousskii Invalid*, a decree of the 1st June last authorises the opening of the Trans-Baïkal Railway for travellers and for goods traffic. The first portion (63 kilometres) goes from Irkoutsk to the Baïkal Lake. At the station at the latter place the train is placed upon a steam ice-breaking raft, and landed at the station of Myssovski. It then runs along the rails for about 1,065 kilometres to Striétensk, on the River Amour. From thence the journey is continued by steamer on the Amour to Khabarovsk, from which place the Oussouri railway line commences.

On the Trans-Baïkal line the towns of Verknéoudinsk, Tschita, Nertchinsk, and Striétensk are situated. It is from the station of Kaïdalovsk, near Tschita, that the Chinese branch, at present in course of construction, starts, which runs to Port Arthur. The Trans-Baïkal Railway is thus the last link of the Trans-Siberian in the direction of Port Arthur, and is now in almost complete working order.

A traveller can at the present time (from July of this year) go from St. Petersburg to Port Arthur in 29 days, in the following manner:—

From St. Petersburg to Irkoutsk, express train	...	12 days.
,, Irkoutsk to Striétensk, by the Trans-Baïkal	.	4 ,,
,, Striétensk to Khabarovsk, by steamer on the Amour		7 ,,
,, Khabarovsk to Port Arthur, by Nikolski	...	6 ,,
Total	...	29 days.

Thus, in a very short time, Russia in Europe will be connected by rail with its most distant *points d'appui* in the extreme East: Vladivostok and Port Arthur. It is unnecessary to lay stress on the immense importance of this from a military point of view.

The various forces stationed in the Siberian and Amour districts, as well as at Port Arthur, have been shown above. All these troops may be assembled, wherever necessary, in a comparatively short time, by means of the East Asian railways. The garrisons of Port Arthur and Vladivostok can receive as many reinforcements as necessary to prevent a landing, not taking into consideration the fact that these places can be readily assisted by the Siberian flotilla, and by the Pacific Squadron. No other European Power, desirous of entering into a conflict with Russia in these regions, could find themselves in an equally advantageous position. Just as the railroads which Russia has thrust towards Eastern Asia assure her a preponderance in those latitudes, so does the Trans-Caspian Railway provide her with an equally advantageous position in Central Asia.

By the branch line which goes to Andidjan troops may be placed on the frontier of Western China, and by the line from Merv to Kouchk they may be massed on the Afghan frontier, 130 kilometres from Herat.

These lines may be useful in a very short time not only to the troops from Turkestan, but also to those from the Caucasus.

A despatch of troops from the Caucasus to the Afghan frontier was made, as a tentative measure, in the beginning of January, 1900. A detachment of one battalion was transported, with all its impedimenta, by two trains from Tiflis to Bakou, by sea from Bakou to Krasnovodsk, and again by train from Krasnovodsk to Kouchk. This trial has shown that in less than eight days the heads of columns

of an army corps leaving the Caucasus may arrive at the advanced post of Kouchk.

As regards the instruction of officers, special attention has been given to the study of foreign languages. Centres of instruction have been formed in several military districts for the study of French and German.

A military school for the teaching of Hindustani, of which the course lasts for two years, now exists at Askhabad. Several officers have already obtained certificates at this school. On the 13th July, last year, an Oriental institute was opened at Vladivostok for the study of Chinese by officers. This language will most certainly become of increasing importance for Russian officers.—*Précis* from *Revue du Cercle Militaire* and *Rousskii Invalid.*

SWITZERLAND.—A census has recently been taken in Switzerland of all horses and mules aged respectively more than 4 and 3 years, in order to ascertain their fitness for military service. The boards appointed by the canton governments, and composed chiefly of a veterinary surgeon and an officer from the mounted branches, sat twice a day, viz.: at 8 a.m. and at 3 p.m. The horses of one or more communes were brought by their owners to a place appointed beforehand, accompanied by a delegate from the commune whose duty it is, in the event of mobilisation, to conduct the contingent of horses to the place of inspection. The canton authorities also place at the disposal of the experts a functionary, who has a thorough knowledge of local conditions, and whose duty it is to see that all the horses of the country are shown at the time. He takes note of all owners who have not responded to the summons. These are reported as refractory and have to bear the expense of a supplementary inspection. In populous places the census work is organised so that 150 to 200 horses may be examined at each sitting. The horses and mules must be shown quite bare and without harness of any description.

The following form is prepared for each commune and signed by the members composing the Board.

Horse Census in 1900.

The ..... Commune ..... Canton.

Number.	Owner.	Description.							Saddle Horse.					Draught horses.			How the horses are actually employed.	Mules for use as pack animals.	Unfit.	Why unfit.	Remarks.
		Age.	Height.	Breed.					Officers' Horses.			N.C.O.'s Horses.		For batteries.	For military train.	For use in emergency.					
				Heavy.	Light.	Mixed-breed.	Half-bred.	Thorough-bred.	Of embodied officers.	Trained.	Capable of being trained.	Trained.	Capable of being trained.								

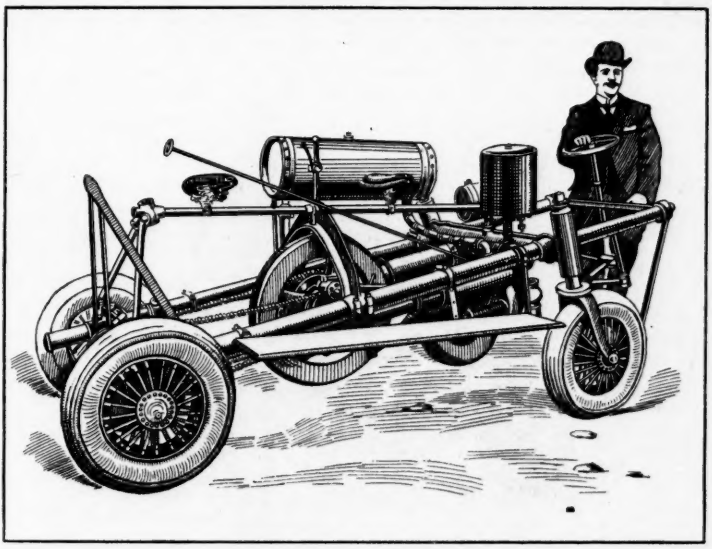
The boards must send these forms day by day to the office of the General Staff at Berne, and report every Saturday to the Chief Veterinary Officer on the progress of the census. The members of the boards are allowed 20 francs a day, in addition to the refunding of their travelling expenses.

The census commenced on the 30th April, and ended on the 31st May.

Position artillery, fortress troops, telegraph companies, balloon companies, and cyclists will soon be armed with a short rifle with a calibre of 7·5 millimetres.

This new weapon, called "*fusil court, M. 1889-1900,*" has the same breech system and takes the same ammunition as the infantry rifle at present in use, M. 1889-1896, but the magazine will be reduced so as to only carry 6 instead of 12 cartridges; the total length of the weapon will be 1·10 metres instead of 1·30 metres; the weight 3·6 kilogrammes instead of 4·3 kilogrammes, and the price 79 instead of 85 francs. The accuracy of fire will be equal to that of the infantry rifle up to about 1,000 metres. The Federal Council foresees the necessity, sooner or later, of arming the field, mountain, and park artillery, and the administration troops in the same manner.—*Bulletin de la Presse et de la Bibliographie Militaires.*

UNITED STATES. — The persistence with which the idea is advocated of utilising the bicycle and the automobile in warfare, proves that the builders and users have full faith in the ability of these machines, not only to stand the tremendous strain of a military campaign, but to find a field in which they can



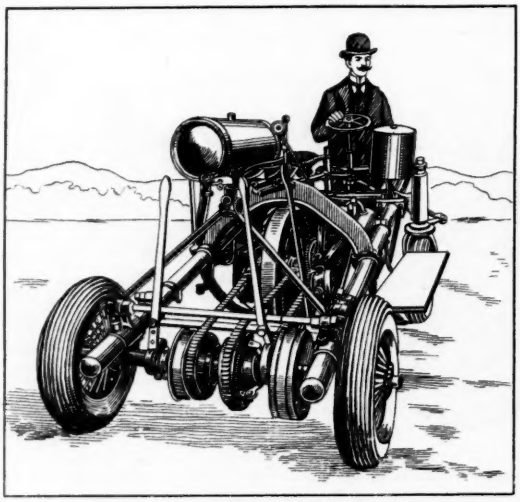
A MILITARY AUTOMOBILE.

Cylinders, 5¼ inches diameter by 12 inches stroke; H.P., 36; Wheels, 22 inches diameter; Tyres, 5 inches diameter; Total weight, 1,500 lbs.

give special and very suitable service. Generally speaking, such an armoured train built for travelling across country, or on the roads, is an automobile, and as such it may be said to have proved that automobilism has a future before it in military operations.

The automobile herewith illustrated is a further attempt in this direction. The special field of operations for which the Pennington war automobile is designed is that of light artillery and the machine gun—more particularly the latter. It has been built with the idea of carrying a couple of Maxims or Colts with their detachment rapidly into action; and for this purpose it is provided with engines of exceptional power, and with a belt of armour not shown in the illustrations. It has been constructed with a low centre of gravity, and its bulk has been reduced to the smallest limit consistent with the duties it is required to perform.

The framework of the machine consists of two longitudinal 3-inch weldless steel tubes, to which the rear axle and the steering heads of the front wheels are firmly secured. The two main tubes and the whole framework are tied together with cross braces of manganese bronze, and with braces formed of a smaller diameter tubing. The crank shaft is placed in the middle of the frame at the point where the main cross brace occurs. A heavy fly-wheel is carried at the centre of the shaft, and on each side of it and bolted to the main frames are two cylinders, 5¼ inches in diameter by 12 inches stroke, which are made of weldless tubing, and are water-jacketed. The cooling tank is carried on the front of the machine and serves the purpose of a wind-shield. Power is transmitted from the crank shaft to the driving shaft by means of two chains driven from either side of the fly-wheel. There are, as will be noticed from the illustrations, gears for two speeds, the lower for hill climbing and for work on heavy roads, the other being a high-speed gear suitable to fast travelling on good roads. Changes in speed are effected by means of improved friction clutches which enable the gears to be thrown in and out without shock. The tank capacity, both for water and gasoline, is sufficient to enable these machines to run from 150 to 200 miles without replenishing. In order to secure thorough ignition, the motor is fitted with both electric and



REAR VIEW, SHOWING ENGINES AND GEARING.

hot-tube methods of ignition. Leather covers are provided both above and below the running parts to protect them from mud and dust. It will be noticed from the engravings that the machine is well suited to the attainment of high speeds. Its centre of gravity is very low, its bulk small, and its H.P. unusually large, the latter being estimated at from 36 to 40 H.P. We are informed by the company

that in a speed trial on a measured half-mile of track, a rate of speed was attained of over a mile a minute.

It will be noticed in the illustrations that the wheels, because of the large diameter of the tyres, are well suited to rough roads. The wheels are 22 inches in diameter, the tyres themselves are 5 inches in diameter. The total weight of the machine in working order is 1,500 lbs. As completed for war purposes, the machine will be covered on the front and sides with armour which will be proof against bullets, and except at close ranges, against fragments of shell. The machine will accommodate eight people; a steersman in front, a driver, who will occupy the rear seat, and a crew of six, seated three on a side above the footboards.—*Scientific American.*

NAVAL AND MILITARY CALENDAR.

JULY, 1900.

1st	(S.)	12th Bn. R.F.A. R.-7 Ammunition Column Unit	Left India for China in the "Itinda."
2nd	(M.)	Sir C. Clery occupied Greylingstad, in the Transvaal.	
3rd	(T.)	H.M.S. "Diana" arrived at Portsmouth with relieved crews from Australia.	
,,	,,	H.M.S. "Argonaut" left Plymouth for China.	
,,	,,	Lord Methuen captured the commander of De Wet's scouts and Andries Wessels, leader of the Afrikander Bond.	
,,	,,	Boers attempted to recapture Ficksburg, but were repulsed and driven off by General Paget.	
,,	,,	China Divisional Staff No. 1 Brigade Supply Column	Left India for China in the "Zebenghla."
,,	,,	1st Infantry Brigade Staff Wing 24th Punjab Infantry Section No. 43 Native Field Hospital	Left India for China in the "Nuddea."
,,	,,	Wing 24th Punjab Infantry Section No. 43 Native Field Hospital	Left India for China in the "Nairung."
4th	(W.)	General Jarnaut resigned his position as Commander-in-Chief in the French Army.	
5th	(Th.)	H.M.S. "Britomart" and "Bramble" left Plymouth for China.	
,,	,,	Draft 14th Hussars ,, 17th Lancers Detachment R.A.M.C. Remounts, Cavalry and R.H.A.	Arrived at Cape Town from England in the "Nomadic."
,,	,,	Draft 16th Lancers ,, R.A. (Artificers) ,, R.E. (Telegraphists) ,, Bedford Regiment ,, 1st Bn. Royal Irish Regiment ,, 2nd Bn. Gloucester Regiment Detachment R.A.M.C. Remounts' Cavalry and R.A.	Arrived at Cape Town from England in the "Montrose."
6th	(F.)	Squadron 1st Bengal Lancers Section No. 42 Native Field Hospital	Left India for China in the "Uganda."
,,	,,	Squadron 1st Bengal Lancers Section No. 42 Native Field Hospital	Left India for China in the "Umpta."
,,	,,	Wing 1st Sikh Infantry Section No. 42 Native Field Hospital	Left India for China in the "Nawab."
7th	(Sat.)	Generals Clements and Paget entered Bethlehem after defeating De Wet.	

7th (Sat.) The Boers put 800 prisoners of the Imperial Yeomanry and Derbyshire Militia over the Natal Border.

,, ,, Wing 1st Sikh Infantry
Section British Field Hospital
} Left India for China in the "Warora."

,, ,, 26th Bombay Infantry
Section No. 63 Native Field Hospital
} Left India for China in the "Virawa."

,, ,, 30th Bombay Infantry
Section No. 68 Native Field Hospital
} Left India for China in the "Duke of Portland."

,, ,, Squadron 1st Bengal Lancers
Section No. 47 Native Field Hospital
} Left India for China in the "Itaura."

8th (S.) 3rd Madras Native Infantry
Section No. 66 Native Field Hospital
} Left India for China in the "Ballaarat."

9th (M.) Boers defeated at Bronkerspruit and to the west of Pretoria.

,, ,, Wing 22nd Bombay Infantry
Section No. 47 Native Field Hospital
} Left India for China in the "Wardha."

,, ,, Wing 22nd Bombay Infantry
Section No. 47 Native Field Hospital
} Left India for China in the "Patiala."

,, ,, Wing 7th Bengal Infantry
Section 43rd Native Field Hospital
} Arrived at Hong-Kong from India in the "Nerbuddha."

,, ,, Wing 1st Madras Pioneers
Section No. 47 Native Field Hospital
} Left India for China in the "Vadala."

10th (T.) Annual Partial Mobilisation of Fleet commenced.

,, ,, Boers captured Nitral's Nek with 2 guns R.H.A. and men of Scots Greys and Lincolnshire Regiment.

,, ,, Major-General Smith-Dorrien defeated the Boers at Krugersdorp.

,, ,, Draft 19th Hussars
,, Norfolk Regiment
,, West Riding Regiment
Detachment R.A.M.C.
Remounts, Cavalry and R.A.
} Arrived at Cape Town from England in the "St. Andrew."

,, ,, Wing 7th Bengal Infantry
Section No. 39 Native Field Hospital
} Arrived at Hong-Kong from India in the "Palmacotta."

12th (Th.) No. 4 Company Bengal Sappers and Miners
Section No. 39 Native Field Hospital
} Left India for China in the "Nevassa."

13th (F.) No. 3 Company Madras Sappers and Miners
Section No. 39 Native Field Hospital
} Left India for China in the "Sirsa."

14th (Sat.) Lord Dundonald captured a Boer camp near Vilpoort.

,, ,, Tientsin captured by the Allies, who has 700 casualties. British loss 20 killed, 93 wounded. 62 Chinese guns were captured.

,, ,, 12th Battery R.F.A.
R.-7 Ammunition Column Unit
} Arrived at Hong-Kong from India in the "Itinda."

15th (S.) Colonel Willcocks and his column relieved Kumasi.

,, ,, Wing 1st Bn. 4th Gurkha Rifles
No. 2 Company Bombay Sappers and Miners
Section No. 66 Native Field Hospital
} Left India for China in the "Nowshera."

,, ,, Wing 1st Bn. 4th Gurkha Rifles
Section No. 66 Native Field Hospital
No. 2 Brigade Supply Column
} Left India for China in the "Canning."

,, ,, Draft 2nd Dragoons
,, 6th Dragoons
,, Royal Lancaster Regiment
Detachment R.A.M.C.
Remounts, Cavalry and R.A.
} Arrived at Cape Town from England in the "Pinemore."

15th (S.) China Divisional Staff
No. 1 Brigade Supply Column
} Arrived at Hong-Kong from India in the "Zebenghla."

,, ,, 1st Infantry Brigade Staff
Wing 24th Punjab Infantry
Section No. 43 Native Field Hospital
} Arrived at Hong-Kong from India in the "Nuddea."

,, ,, Wing 24th Punjab Infantry
Section No. 43 Native Field Hospital
} Arrived at Hong-Kong from India in the "Nairung."

16th (M.) 2nd Infantry Brigade Staff
2nd Bengal Infantry
} Left India for China in the "Chusan."

,, ,, Wing 1st Madras Pioneers
Section No. 39 Native Field Hospital
} Left India for China in the "Pentacotta."

18th (W.) China declared war against Russia.

,, ,, 1,500 Boers with 5 guns slipped through the British cordon between Bethlehem and Ficksburg.

,, ,, Proclamation issued at Pretoria ordering all the wives of Boers still bearing arms against the British into the enemy's lines.

19th (Th.) Grand Review of French Fleet at Cherbourg by the President of the Republic.

,, ,, Lord Methuen occupied Heekpoort.

,, ,, De Wet's force repulsed and broken at Lindley.

,, ,, Wing 1st Sikh Infantry
Section No. 42 Native Field Hospital
} Arrived at Hong-Kong from India in the "Nawab."

,, ,, Squadron 1st Bengal Lancers
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} Arrived at Hong-Kong from India in the "Uganda."

,, ,, Squadron 1st Bengal Lancers
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} Arrived at Hong-Kong from India in the "Umpta."

20th (F.) Wing 1st Sikh Infantry
Section British Field Hospital
} Arrived at Hong-Kong from India in the "Warora."

,, ,, Squadron 1st Bengal Lancers
Section No. 63 Native Field Hospital
} Arrived at Hong-Kong from India in the "Itaura."

21st (Sat.) Boers cut British line of communication and captured a supply train and 100 men.

22nd (S.) 3rd Madras Native Infantry
Section No. 66 Native Field Hospital
} Arrived at Hong-Kong from India in the "Ballaarat."

,, ,, Wing 22nd Bombay Infantry
Section No. 47 Native Field Hospital
} Arrived at Hong-Kong from India in the "Wardha."

,, ,, Wing 22nd Bombay Infantry
Section No. 47 Native Field Hospital
} Arrived at Hong-Kong from India in the "Patiala."

23rd (M.) Draft Royal Engineers
,, Somerset L.I.
,, 2nd Bn. East Yorks Regiment
,, North Stafford Regiment
,, 2nd Bn. Seaforth Highlanders
,, Royal Dublin Fusiliers
A.S.C.
Detachment No. 14 General Hospital
} Arrived at Durban from England in the "Orient."

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} Arrived at Hong-Kong from India in the "Vadala."

24th (T.) Hostilities between A and B Fleets commenced.

25th (W.) No. 4 Company Bengal Sappers and Miners
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26th (Th) Sir A. Hunter defeated the Boers south of Bethlehem; British casualties about 50.

,, ,, Kokofu, Ashanti, and a large rebel camp captured by Colonel Willcocks.

,, ,, New South Wales Assembly decided to send a contingent for service in China.

7th (Sat.) The Boers put 800 prisoners of the Imperial Yeomanry and Derbyshire Militia over the Natal Border.

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26th (Th.)	14th Sikhs left India for China in the "Tamania."	
,, ,,	No. 3 Company Madras Sappers and Miners Section No. 39 Native Field Hospital	Arrived at Hong-Kong from India in the "Sirsa."
27th (F.)	General French occupied Middleburg without opposition.	
28th (Sat.)	Wing 1st Bn. 4th Gurkha Rifles No. 2 Company Bombay Sappers and Miners Section No. 66 Native Field Hospital	Arrived at Hong-Kong from India in the "Nowshera."
,, ,,	Wing 1st Bn. 4th Gurkha Rifles Section No. 66 Native Field Hospital No. 2 Brigade Supply Column	Arrived at Hong-Kong from India in the "Canning."
29th (S.)	King Humbert of Italy was assassinated at Monza by an Anarchist named Bresci.	
,, ,,	B Battery R.H.A. left India for China in the "Ujina."	
30th (M.)	H.M.S. "Diana" paid off at Chatham.	
,, ,,	H.M.S. "Pegasus" arrived at Spithead from S.E. Coast of America.	
,, ,,	2nd Infantry Brigade Staff 2nd Bengal Infantry	Arrived at Hong-Kong from India in the "Chusan."
,, ,,	Wing 1st Madras Pioneers Section No. 39 Native Field Hospital	Arrived at Hong-Kong from India in the "Pentacotta."

FOREIGN PERIODICALS.

The contents of the Naval Periodicals for July will be given in the September number of the JOURNAL.

MILITARY.

AUSTRIA-HUNGARY.—*Militär-Zeitung.* Vienna: 6th July, 1900.—"Nuptials of H.I.H. the Archduke Franz Ferdinand." "The Entanglements in China." 14th July.—"The Entanglements in China" (*continued*). "Mobilisation of the Russian Amour Troops." "The English Mediterranean Fleet at Trieste." 22nd July.—"Independence, Individuality, and Education." "The Entanglements in China" (*continued*). "Machine Guns in War." 30th July.—"The Encouragement of Sport in the Army." "Artillery Scouting Duty." "The Entanglements in China" (*continued*).

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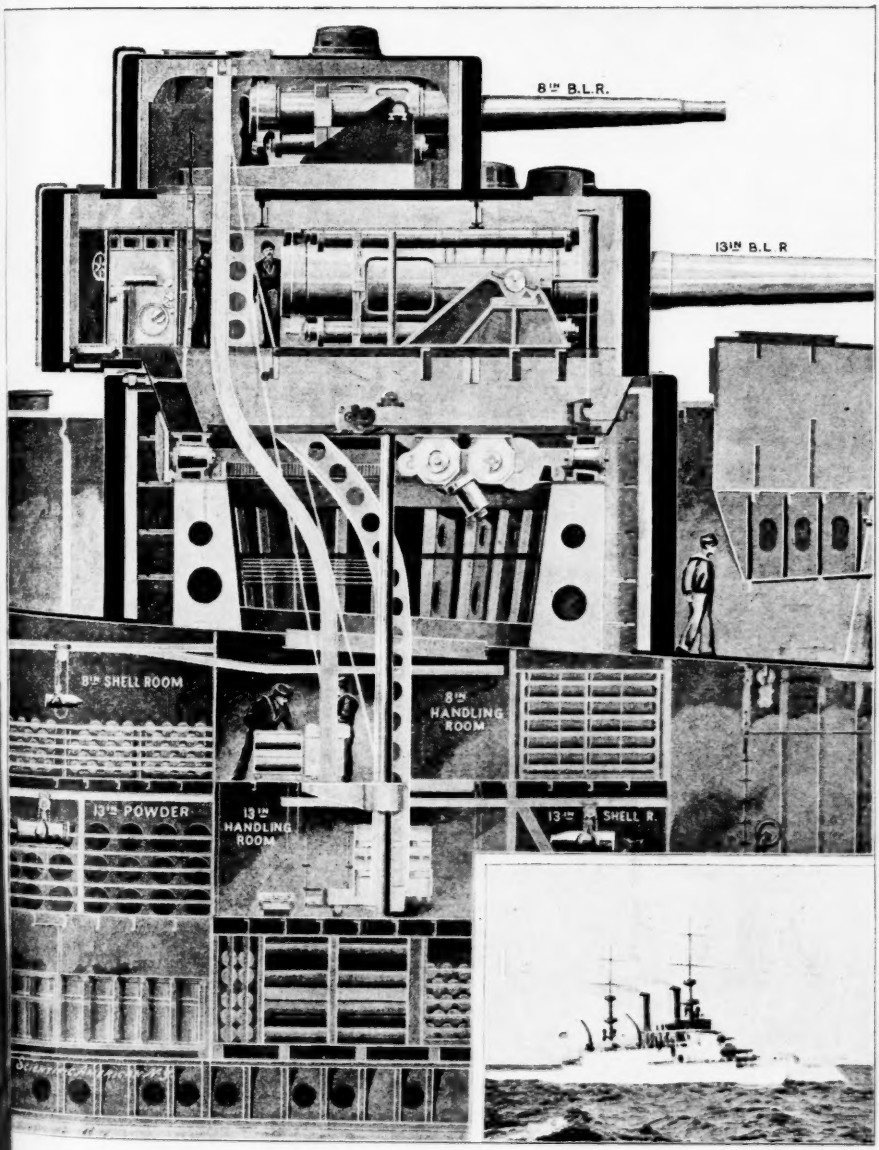
SWITZERLAND.—*Revue Militaire Suisse.* Lausanne: July, 1900.—"Preparatory Drills for the Manœuvres of the IIIrd Army Corps in 1900." "The Cadet Rifle, Mod. 1897, and the Short Rifle, Mod. 1889-1900." "The Passage of the Great St. Bernard in 1800" (*continued*). "Q.F. Field Artillery *Matériel* of 7·5 centimetres."

NOTICES OF BOOKS

War of the Nineties: A History of the Warfare of the last Ten Years of the Century. London: Messrs. Cassell & Co., Ltd. 1900.

When we reviewed this book in the July number of the JOURNAL we were not aware who the author was, and his name was consequently omitted. We now learn that Captain A. Hilliard-Atteridge, at one time War Correspondent of the *Daily Chronicle* in the Soudan, is the author, and we are glad to supply the omission.



VERTICAL SECTION THROUGH SUPERIMPOSED FORE TURRETS OF U.S. BATTLE-SHIP "KEARSARGE" FROM KEEL TO ROOF OF UPPER GUN EMPLACEMENT.

For description see Naval Notes.

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